

MEAN MACHINE: R/C STREET GAMARO



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Radio Control **CAR ACTION**

THE WORLD'S PREMIER R/C CAR MAGAZINE

September 1991

**SCREAMIN'
FOR
VENGEANCE!**

**ASSOCIATED
TEAM CAR**

**SLOT MACHINE
UNCOVERED!**

**HOW TO:
SHOCK TUNING**

**KYOSHO
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**High-Tech Motor Tester—
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**TRAXXAS
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VOLUME 6, NUMBER 9

SEPTEMBER 1991

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EDITORIAL

by STEVE POND



TOO SCALE, OR NOT TO SCALE?

IN THE EARLY days of electric R/C cars, many kits (such as the Tamiya Sand Scorcher) were designed to look true to scale. As many elements as possible of the full-scale car's design were integrated into the R/C kit, but it was soon obvious that this approach wasn't the most effective where performance was concerned.

Over time, R/C kits—especially those designed for competition—began to incorporate performance features that were exclusive to the downsized racers. Modern competition R/C cars now resemble their full-scale counterparts only in appearance. Their chassis have been designed to allow maximum performance, given the cars' weights, speeds and the disproportionate size of the obstacles they encounter. Though R/C cars are only a fraction of the size of full-size cars, their respective speeds far exceed their "scale" speeds. For example, the average 1/10-scale pan car is capable of *actual* speeds in excess of 55mph on a large oval track. That's 550mph in *scale* speed!

What's the point? Concern with preserving scale appearance has prompted disagreement among R/C-race sanctioning organizations about how far we should develop our racing cars. A couple of the most publicized disagreements concern the way in which stock cars have the rear of their bodies cut off, while wings are added—and, of course, there's the 2.2-inch off-road wheel issue.

For stock cars, leaving the rear of the bodies intact and prohibiting wings will give us racers that are more like full-scale ones; but cutting out the rear of a body and adding a wing increases handling stability. The question is: are we earning points for having good-looking cars or for going the fastest? As for 2.2-inch wheels for off-road cars, neither of the two largest sanctioning organizations in the U.S. allows their use. The current rules, however, allow a maximum rim diameter of 2.150 inches—a difference of only 5 hundredths of an inch! The 2.2-inch wheels haven't proven themselves superior to the smaller wheels, but what's significant is that much of foreign tire technology is moving in the direction of 2.2-inch wheels. By disallowing them, we're severely limiting our choices. Manufacturers that once made tires and wheels that are legal under current rules are switching to the 2.2-inch size.

We all want to avoid the "doorstop," wedge-shaped body that was popular with slot cars, but we have to determine whether we're racing motorized scale models or purpose-built R/C racing cars. There are many opinions on where we should draw the line as far as rules are concerned, but when instituting or changing rules, it should be kept in mind that we're *racing*.

On page 109, you'll find our Reader Survey. We hope you'll all respond, because the information will help us to give you what you want in *Car Action*. Don't wait!

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Printed in the U.S.A.

LETTERS

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

MONSTER TRUCK MAYHEM

I own a Kyosho Big Boss, and I'm looking forward to getting a Team Losi JR-XT. Will TrackMaster's Turbo-glide, belt-drive transmission for the JR-X2 also fit in the XT? Also, will most (or all) of the after-market hop-up parts for the X2 fit the XT?

My friend has a question for you. He owns a Traxxas Hawk and loves it. He

wants to know if the new Traxxas tranny that's standard with the new Blue Eagle will work with the Hawk?

We both love your magazine. Keep up the good work!

ROBERT SMITH (JR-XT)
JEFF REDDING (Hawk)
Evansville, IN

Robert and Jeff, thanks for writing. The first part of your question is easy: just about any Team Losi part (or any other after-market part) will fit the JR-XT. Team Losi has gone to great lengths to ensure that all of the main components of its JR series cars are interchangeable.

As for the second part of your letter (obviously Jeff's contribution), a quick

call to the Traxxas folks was in order. The Blue Eagle transmission will fit the Hawk, but only if the chassis hasn't been modified. The Hawk's instructions tell you to remove part of the the chassis tub when you build it. Unfortunately, this section of chassis is needed to mount the Blue Eagle tranny. All is not lost, though. Replacement chassis are readily available, and they're only \$10. Also, instruction manuals included with the newer Hawk kits include a revision of this procedure that tells you not to modify the chassis if you plan to install a Blue Eagle (Pro Series) transmission.

FM

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DESERT STORM CLOD!

I'm a part of Operation Desert Storm, and I'd like some advice on the Clod Buster. My Clod is completely assembled, but I was shipped out before I could run it. I keep dreaming about it, though! I have a few questions: what would be a good radio and speed controller to use? Would Kyosho Gold or Platinum long shocks work well on the Clod? The truck will be used for some off-road driving and some pulling. I'd like to have any information you could give me. You have a great magazine. Keep up the great work.

SGT. ALBERT KOOPMAN

1st AD

Operation Desert Storm

Thanks for your letter, Sgt. Koopman. We at R/C Car Action are very proud of all of the men and women who serve in the armed forces. They should have let you take your Clod with you to the desert. Mount a few rocket launchers on it, and watch out, Saddam! Seriously, any quality, 2-channel radio system is perfectly adequate, but stick with one of the well-known brands (e.g., Airtronics, KO, or Futaba), as service is an important factor in determining your overall enjoyment of the hobby.

As for a speed controller, if you're going to do any pulling, you'll need an ESC that's designed for this purpose. If you plan on pulling with four to 10 cells, then the Novak 410-MXc is a good choice.

Novak also makes the 828-HV—a speed controller that's designed for truck pulling using eight to 28 cells. For the ultimate in truck-pulling speed controllers, check out PDI's Turbo Zeta; it can be used with up to 32 cells! Kyosho Gold shocks would be excellent for your Clod Buster. Trinity also sells a complete set of replacement shocks for the Clod. FM

DAMN YANKEES!

Why do you guys dump on Tamiya? They have excellent cars and trucks. The shocks are excellent—yes, they're yellow and ugly—but they work very well. I have a race-ready Falcon that can and will whoop

(Continued on page 10)

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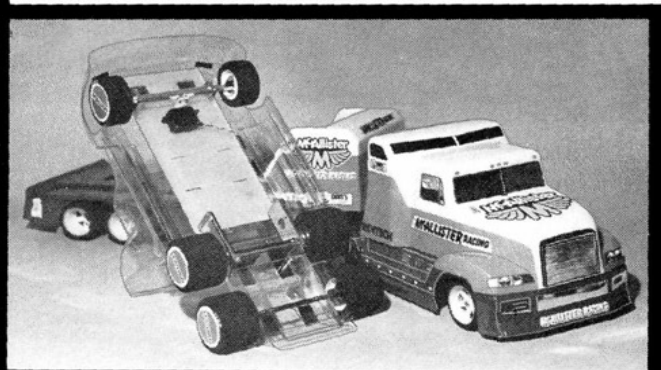
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LETTERS

(Continued from page 9)

anything you dips can sling together! I've already beaten every car in my area—now I'm aiming at Team Losi and Team Associated. Come on guys, give Tamiya a break! If you don't want your Tamiya kits, then send them to me. Don't you Yankees know anything?

WILLIAM C. CHILDERS
Louisburg, NC

Geez, William, lighten up before your arteries harden! I'm only gonna say this once: we at Radio Control Car Action do not, nor have we ever, "dumped" on Tamiya! In fact, we hold Tamiya in the highest regard. I'm trying to think of anything that we've ever printed that could have possibly gotten you so fired-up like this. Perhaps you misunderstood what some of our contributors have written in their reviews about certain Tamiya products. No one—not even Tamiya—would argue that most of its cars and trucks are aimed at entry-level R/C enthusiasts. Some of our reviews do contain hop-up recommendations, in case modelers want to beef-up their vehicle's performance, but this shouldn't be confused with criticism. I hope that my response has helped to cool you down a little. Meanwhile, I'll keep my Tamiya kits. (See, we Yankees do know something!) FM

CAT QUANDARY

I have a mint-condition Traxxas Cat with a stock 540 motor, and it's pretty slow. Could I put a B&R motor or something like it in my car without stripping the gears or burning up the transmission? Some people say my car is a piece of junk and that I should buy an RC10 instead, but I don't have the money. What's your opinion of the Cat? Also, I was wondering if the October '87 issue of *R/C Car Action* is available as a back issue?

KEVIN FREDERICK
Duluth, MN

Kevin, the Traxxas Cat, which is no longer being produced, was designed as an entry-level car in 1987. In its time, the Cat

was a fine way to get started in R/C. No, it's not a piece of junk, but it can't compare with today's entry-level cars. I'm assuming the B&R motor that you want to install in your Cat is of the stock variety because it's "diff death" to use a modified in your car. Providing your transmission is in reasonably good shape, there's nothing to prevent you from bolting in a hot stock motor. You should, however, consider saving your money for one of the better entry-level cars that are currently available; they aren't as expensive as you might think. You can order the October '87 issue by using the order form in any recent *Car Action* magazine. FM

PROS AND CONS OF CONS?

I'm new to this sport, and I have a few questions. I don't know how to charge a hard-wired battery. Which is better—Litespeed's Super-Cons or hard-wiring? I have a Turbo Ultima II with Kyosho's Gold shocks. If I replace them with Kyosho's Platinum shocks, would there be any difference? Also, is a Precision motor good for modified racing, and is a Sassy Chassis good for racing?

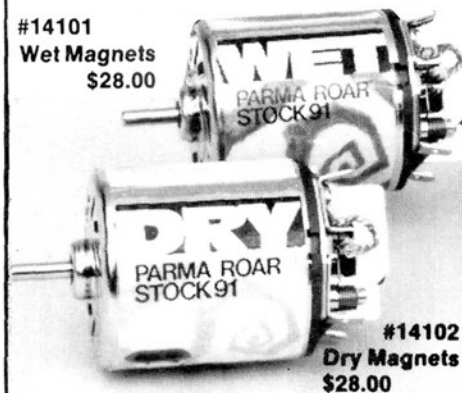
PETER DY
Ridgeway, PA

Peter, hard-wiring has its pros and cons. Properly done (good solder joints, no frayed wires, etc.), hard-wiring your batteries virtually eliminates the voltage loss that's common with most connectors. Hard-wiring, however, isn't the method used by most racers, especially beginners. It requires a good soldering iron and, unfortunately, AC isn't available at many outdoor tracks. You'd have to invest in a butane soldering iron. For off-road racing, the voltage loss with a connector is negligible. If you decide to use them, then I'd definitely recommend Litespeed's Super-Cons; they're the next best thing to hard-wiring, and they're much more convenient at the track.

If you still want to hard-wire, solder pieces of battery braid or Dan's Gold

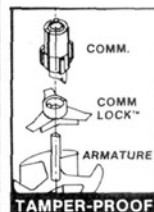
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TWO TO TEE

I'm a proud reader of *Car Action*, as well as a proud owner of a JR-X2. I have the Proformance kit for the JR-X2, which includes, among other things, a longer graphite chassis, long front shocks and H-arm-type suspension, as opposed to the standard five-link. I'm thinking of converting my car to a JR-XT, and I was wondering if the conversion will work with the longer chassis and the different rear suspension. Also, will the body fit? If not, can I get a body that will fit? Thanks for the cool mag!

BRYAN RUAN
Arcadia, CA

Bryan, it sounds as if you're all set to make the conversion. The JR-XT has a longer graphite chassis with 30 degrees of kick-up (the same chassis that comes with the Proformance kit), special body mounts (front and rear), Lexan side dams and, of course, large monster-truck rims and tires. Since the JR-XT and the JR-X2 both have the same five-link rear suspension, you already have most of the parts that will convert your car into a truck. All you need are the rims and tires, the body mounts and the side dams. As for the body, you can use the one from the Pro kit, although a car body may not be allowed in the truck class at some tracks. FM

DARE TO BE DIFFERENT

Recently, I bought a Kyosho Double Dare. I want to install an electronic speed controller with reverse, but I don't know which ones have reverse. Could you tell me which ESCs have reverse and cost less than \$100? I was also wondering if I could use the Clod Buster 4,400mAh battery in

(Continued on page 12)

Bars to the positive and negative poles on your pack. Now you have a place to attach your speed controller wires, and you'll be less likely to overheat your battery when you solder. To charge, simply use alligator clips—but pay attention to polarity.

Stick with the Gold shocks. Like the Ford Edsel, Platinum shocks just didn't cut it. With the shaft's large diameter, so much oil was displaced when the shock was compressed that even the air trapped in the pressure gasket was insufficient to prevent excessive rebound (hydraulic resistance that prevents the piston and shaft from fully entering the shock body).

Don't worry about modifying your Ultima right now, and stay with stock motors until you're more experienced. Buy more battery packs, and go practice! All the after-market parts in the world won't make you a winning driver—practice will. FM

FOAMFOOT?

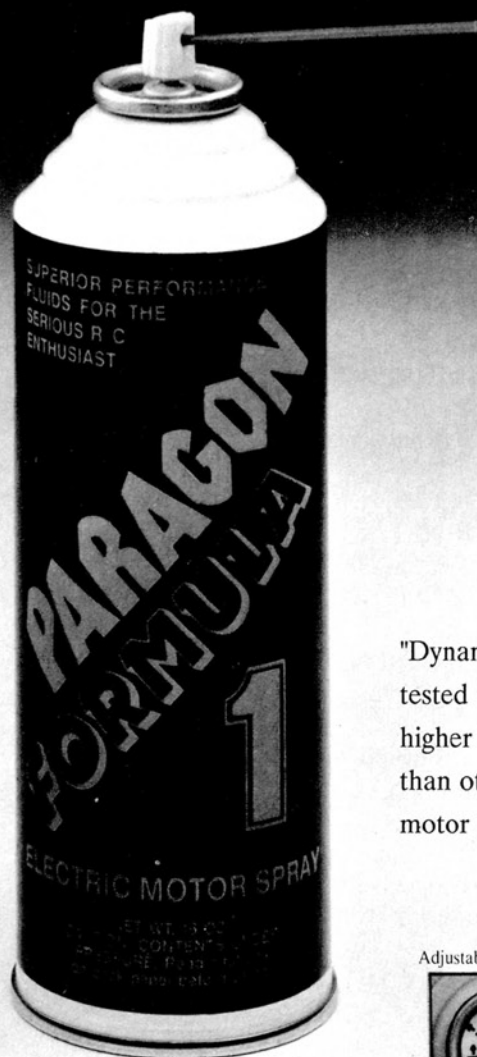
Recently, I bought a Blackfoot, and I think it's great. Could you tell me the name of a manufacturer that makes foam carpet tires for the Blackfoot? On my truck, I have a Thorp Dirt Burner diff in place of the stock one. Could you tell me a good budget modified for my 'Foot that's fast but not so powerful that it tears up my tranny.

ERIC MILLARD
Uniontown, OH

Eric, you're in luck! JG Manufacturing makes foam tires for \$15.95 (part no. 1412) that fit most 2.2-inch truck rims. Also, you might want to check out HPI's new foam tires for monster trucks that come mounted on universal-type Super Star MT wheels.

I don't usually recommend running any kind of modified motor in the Blackfoot, but since the Thorp diff can handle substantially more horsepower than the stock unit can, a mild modified motor is fine. Just about every motor manufacturer makes some kind of budget modified. Twister's Pocket Rocket Series,

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LETTERS

(Continued from page 11)

my truck to increase run times? In my truck, I have the stock LeMans 05 motors. Please help!

BRADLEY GILL
Coquille, OR

Bradley, I have good news, and I have bad news. First, the good news: the Futaba MC12B Mosfet speed controller, the Traxxas XL-1 (part no. 3006) and the Dialed Racing Products 100-amp ESC (part no. DRP 053) all have reverse. They all cost less than \$100, and they'll work in your Double Dare. The bad news? Aerotrend has a 4,400mAh battery pack for the DD, but the extended run times may overheat the above-mentioned speed controllers. To use the 4,400mAh battery, you'll have to buy a more expensive ESC that can handle the longer run times. FM

LOOKING FOR LARRY

In the "Letters" section of our July issue, Larry Grievous of the Bronx, NY, asked about tracks that are accessible for racers in wheelchairs. Dave Hoffman of Island Hobbies wants Larry to know that his new track has a wheelchair ramp. If you're out there, Larry, please give Dave a call at (516) 254-6229, or stop by to check out the track at 410 Commack Rd., Deer Park, NY 11729.

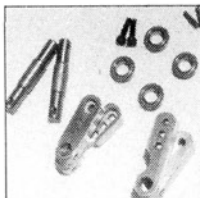
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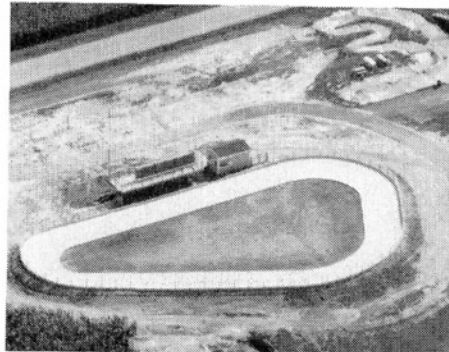
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Speed demons will love Ameri-Trac's Insane Run! There's no limit to the number or types of motor, or to the number of cells you can use, but you must use the specs for 1/10 scale and run a NASCAR body. If you have the fastest single lap time in a 2-minute run, you'll receive the Speed Demon's Trophy Award and keep it until your record is broken. Your name will be posted at Ameri-Trac as "Speedster of the Domain."

Ameri-Trac also has a 330-foot off-road dirt track, a fully stocked hobby shop—Country Corner Hobbies—and a concession stand. What more could you want?

Ameri-Trac is on Route 3 in Mattoon, IL, 61938. For more information, call Larry Annis at (217) 234-8707.

STUFF

12L-10L-SUPER SPEEDWAY

PRO ARM BRACE
The Pro Arm Brace provides rigid support to the front suspension arms. It helps front suspension to work properly and improves steering responses. The Pro Arm Brace is made of 0.085" graphite for better strength and durability. Super Speedway is provided with an extra body mount screw hole at the center for better support.

PRO UPPER BRACE
It is provided with 13 holes in the damper area to keep optimum amount of silicone oil for a longer period of time. The brace is made of 0.085" graphite for durability. Also, screw holes for wing mounts are provided.

AERO LOWER BRACE
The Aero Lower Brace with 30° kick up provides excellent spur gear protection from impact and adds extra down-force to the car at high speed track.

Aero Lower Brace, Pro Upper Brace, and Pro Arm Brace are available for the RC10L, RC12L, RC10L Super Speedway, & RC12L. The items are available through your local hobby shops. Call HPI for more information or send \$2 for catalogs.

HPI

HOBBY PRODUCTS INTERNATIONAL

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HPI DESIGN
CALIFORNIA

California
USA

INSIDE SCOOP

by CHRIS CHIANELLI

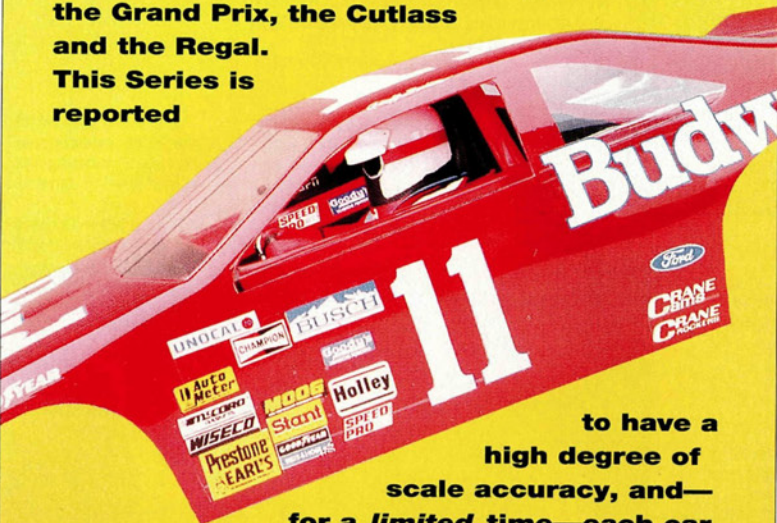


As directed by the Ayatollah of Radio Controlla, Commander Crash Chianelli reporting back to the faithful followers of the Grand High Exalted with pertinent information! I'm back from my latest espionage excursion with microfilm, spy shots and stolen communiqués that read as follows:



concourse READY

MRP has introduced the five new 1991 NASCAR bodies that compose its "Concourse Series": the T-Bird (shown here), the Lumina, the Grand Prix, the Cutlass and the Regal. This Series is reported



to have a high degree of scale accuracy, and—for a limited time—each car includes a scale interior that has a driver (with a helmet and goggles, a detachable sun visor and a shoulder harness), a steering wheel, a shifter, a roll bar and an ESPN camera. How limited is this offer? I haven't been able to find out.

ROCK-HARD



LOSI LIVING COLOR

Team Losi has completed its new videotape: "Doing It Right." It's supposed to help novices avoid some common pitfalls, and it includes valuable racing tips from the likes of Gil Losi Jr., Jack Johnson, Gary Kyes, Kyle Reed, Jay Halsey and Ron Rossetti. I'm also told the tape has info on the manufacturing and testing of parts. It retails for \$19.95, but wait! The tape will be included with Junior Two and Junior-T kits, free! If you want to get it right, get "Doing It Right."





HUBS

These MK Engineering Superspeedway Ultra Hubs were designed exclusively for the 10L SS. Made of 7075 T8 hard-anodized aluminum, they're lighter and many times stronger than stock aluminum or after-market magnesium hubs. That's important, considering the speeds and abuse to which superspeedway cars are subjected!



This is the Ra Ra II—Nikko's $1/10$ -scale version of the Toyota/Kyocera solar car. According to sources at Nikko America, the car hasn't yet been perfected. I have full confidence in the Nikko R&D people—masters of the uncommon—and their funds. They'll make this thing perform! I'll keep you posted.



Heela-monster

Direct from Milwaukee, WI, comes the full-size Chopper Monster—a Ford big-block-powered 1972 Bell 206 Jet Ranger. The Chopper Monster was built for both car-crushing and exhibition. It's not a race truck, but a racing version is in the works, as is an R/C

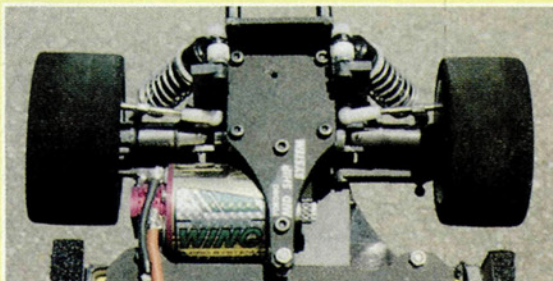


version; I'll definitely keep you posted. Personally, I like the name "Heela Monster"—from Gila monster; you know, those prehistoric reptiles that live in Southwestern U.S. deserts; or maybe the Komodo Dragon Monster—you know, those lizards on the Indonesian islands that snack on deer...never mind, it's not my truck anyway.

YOKOMO **NSX**

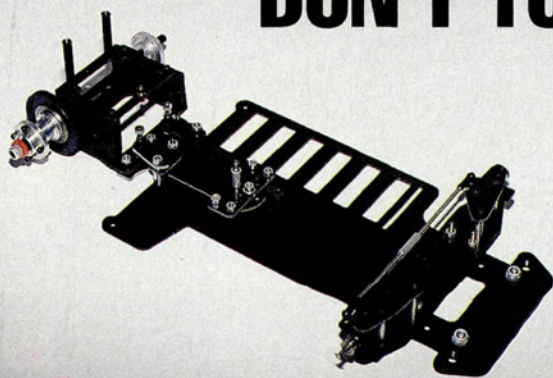


Don't look now, but Yokomo has entered the increasingly popular scale market with this 1/10-scale Honda NSX. The car has upper control-link inde-



pendent suspension on all fours, a mid-mounted direct-drive motor (Yokomo calls it the "Mid Ship System") and a breakaway front suspension. Notice the use of the internal, "lay-down" antenna to preserve the scale appearance. No word yet about availability.

DON'T TURN RIGHT

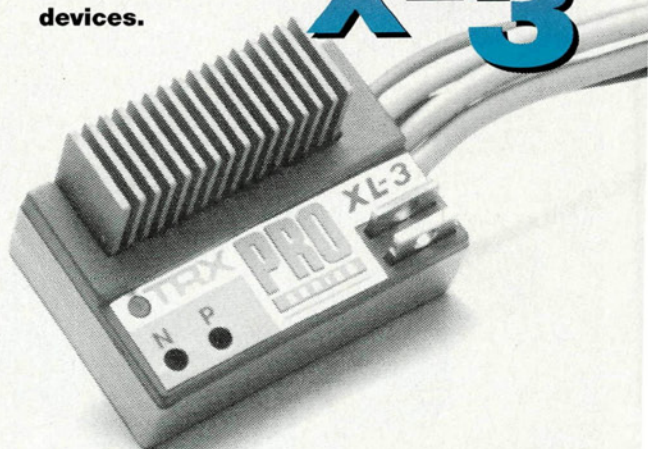


The popularity of superspeedway racing is growing, and Advanced Racing Technologies has introduced its "DTR" (Don't Turn Right) Speedway Racer. The car has many of the features found on the Agitator 2.0, but it has been re-designed for today's fast oval tracks. The rear pod has been narrowed considerably, and the motor has been centered for better balance. A super-light, silicone-filled Delrin damper provides smooth, consistent fore/aft damping. Made of graphite and aluminum, the rear axle has a five-ball-bearing diff for ultra-smooth operation. The race-proven Agitator front end has been narrowed to improve steering response. All this and an offset graphite chassis, BBS wheels and Advanced's Load Actuators make an impressive package.

The new Traxxas TRX Pro XL-3 has a peak rating of 1,788 amps and boasts 99.6 percent efficiency at a featherweight of only 2.1 ounces—including full-length wires and a heat sink.

Traxxas recommends it for off-road use because it has no time delay or current-squelching devices.

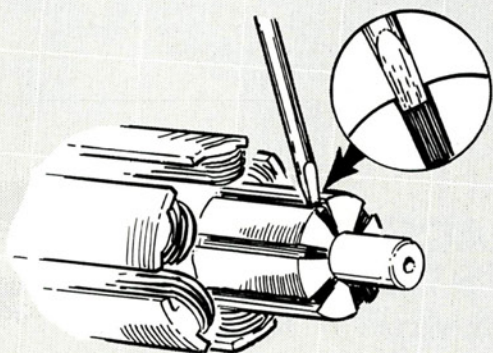
2.1 oz.
XL-3



The power is there when you need it—instantly! The TRX Pro XL-3 also has thermally protected forward and brake sections, and it's reported to be reasonably priced.

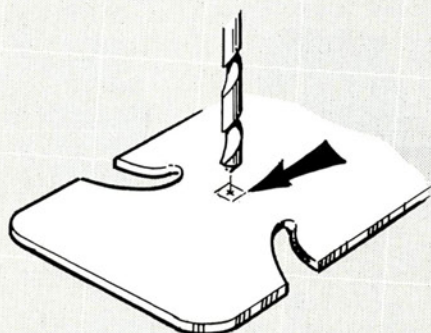
PIT TIPS

by JIM NEWMAN



COMMUTATOR CHISEL

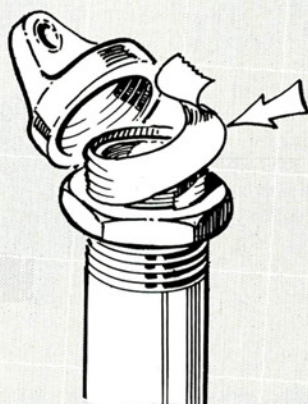
To avoid scratching the copper, clean out commutator slots with a wooden toothpick.
David Davis, New Smyrna Beach, FL



JR-X2 BODY-MOUNT HOLE CUTTING

Instead of using a hobby knife to cut out the scored rectangular body-mount hole on the JR-X2 body, drill through it using a $9/32$ -inch drill bit.

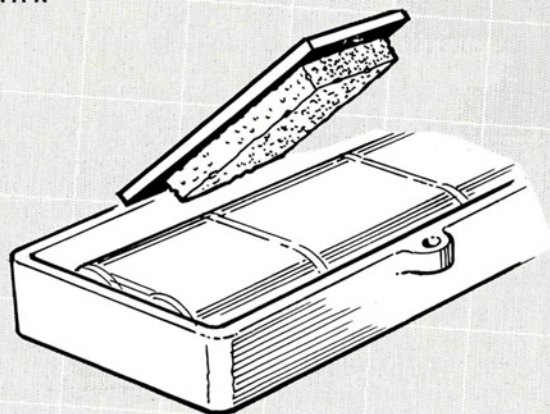
Stan Buchanan Jr., Orlando, FL



LEAKY-SHOCK CURE

Cut a narrow strip of very thin, Teflon, pipe tape (available at plumbing stores), and wrap it twice around the threaded part of a leaky shock unit before you screw its top back on.

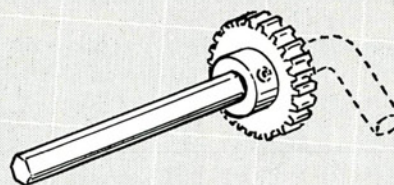
Chris Micena, Tucson, AZ



RATTLE-FREE BATTERY BOX

To hold batteries in your RC10's battery box securely, stick foam inside the lid. The sponge tape gently "crushes" the Ni-Cds into place and prevents them from bouncing around.

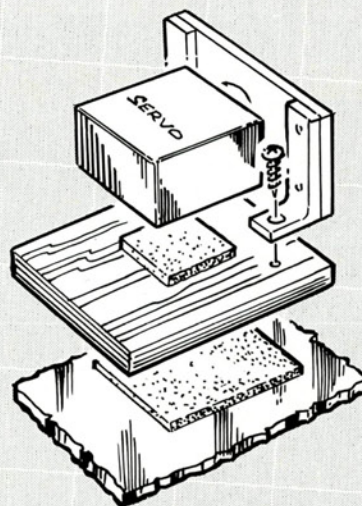
Jon Bennett, Gambrills, MD



ALLEN-WRENCH THUMB WHEEL

This modification allows you to use an Allen wrench in places where its short leg will be an obstruction when you try to turn the wrench. Cut off the short leg using a MotoTool with a thin cut-off disk (wear goggles). Slip an old 18-tooth spur gear over the shaft, and tighten the setscrew.

Dave Millett, Kittitas, WA

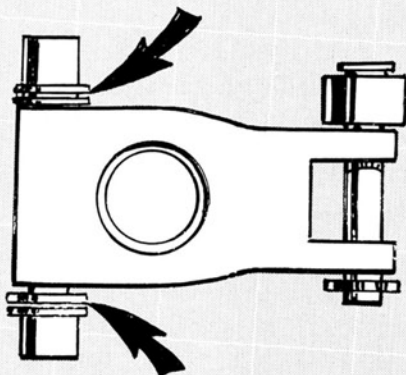


SPEED-CONTROLLER ADAPTER

If you buy a secondhand chassis and find that the speed-controller mounting holes have been enlarged so that they won't fit a mechanical controller, try this. Attach a $1/4$ -inch lite-ply "sub-floor" to the chassis with double-sided tape, and mount the servo on the plate (again, using double-sided tape). Then use screws to attach the resistor brackets to the ply floor.

Jason Burgess, Bellevue, MI

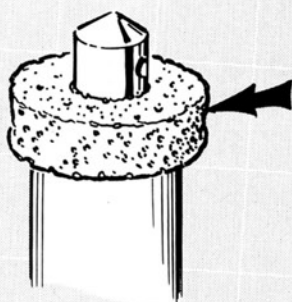
PIT TIPS



RAIDER HUBS FOR THE ASTUTE

If the rear hubs on your Astute break, replace them with Raider hubs. Drill out the upper holes so that they accept the regular pivot pin. Then, to limit sideways movement, shim the lower pivot pin with washers (arrowed). Buy four 5x10mm bearings—an additional expense, but you'll save money in the long run because you'll never have to replace the hub.

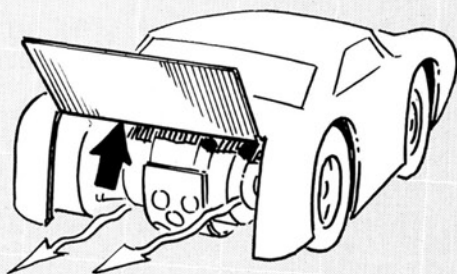
Phil McCaskey, Lancaster, CA



ANTI-RATTLE BODY MOUNTS

Make sponge-rubber washers to slip over your car's body mounts. Before you insert the body clips, press the body shell down firmly so that it gently nips the washers. This prevents the body from moving and stops the mounting holes from wearing excessively.

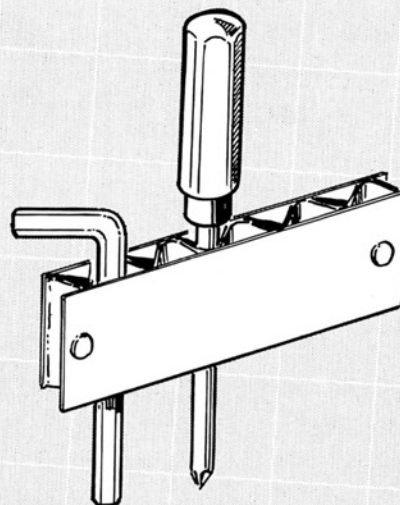
Tom Hill, Walworth, NY



REAR SPOILER

Here's an easy way to make an effective rear spoiler. Cut the rear panel of your car's body and bend it upward as shown. Pinch the plastic along the fold (arrowed) with pliers to make the bend sharp. The open area will also serve as a vent for the hot air from the motor and the battery, etc. You could also glue a stiff piece of wire across the opening to tie the two fenders together.

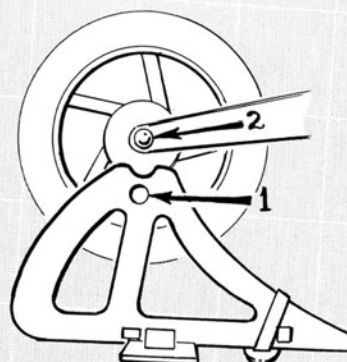
Jamie Barnack, McKenny, VA



CORRUGATED TOOL CADDY

A strip of corrugated cardboard can be a handy, inexpensive organizer. Pin it to the edge of a shelf or carry it in your pit kit.

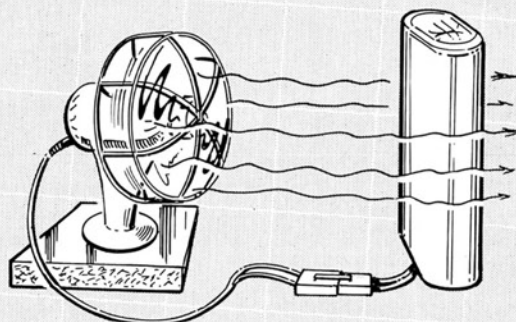
Jeremy Howald, Chester, VT



STABLE MOTORCYCLE STAND

To hold your R/C motorcycle while you work on it, drill an 8mm hole (1) on each side of the stand, and snap the rear axle (2) into place.

David Pugh, Kissimmee, FL



COOL DISCHARGER

When you use the cigarette-lighter plug in your car to discharge your battery pack, keep the pack cool with a 12V automobile fan. Buy one that has a suction-cup base and stabilize it by sticking it to a piece of Plexiglas or Formica.

Gary Acey, Ulica, NY

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah chooses your photo, you'll receive a one-year subscription to Car Action, or an extension to your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1991. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

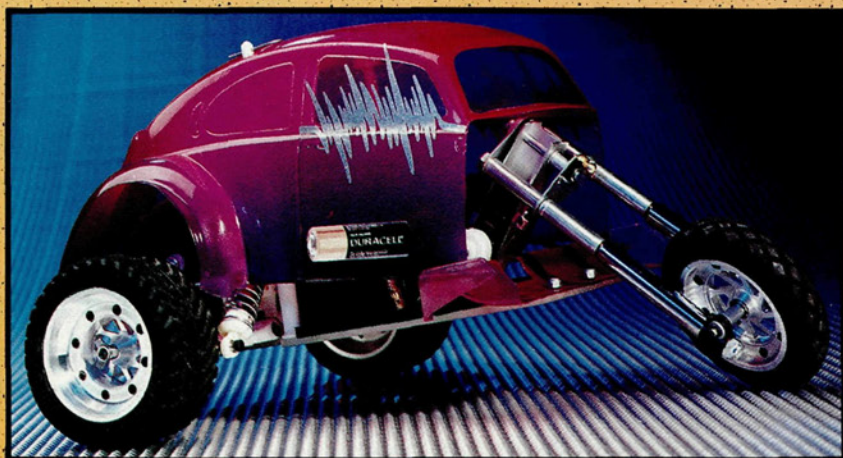


KING TIGER

Mark Piotrowski of Chicago, IL, decided to make a monster tank. He used a Tamiya King Tiger Tank as a base and added a 4-channel radio, a Revtech 18-turn double motor, an 8-cell battery pack, a body that can be lifted to expose a driver and a detailed Parma Hemi engine. A set of working fog lights adds the final details to a great package.

LATER, GATOR!

Rick Rockafellow of Sarasota, FL, hits the "slim" scene with a new Cobra superspeedway (narrow) car. The car has a Thunderbird body painted in the Gator Lager sponsorship colors, a narrowed McAllister stock-car interior and Tekin radio gear. Rounding off the package is a set of dazzling Indy Speed Wheels.



PHUNKI

The answer to that age-old question, "What happens when you leave an RC10 and an old Kyosho Elec Rider in the same room overnight?" has finally been answered. Chris Merl of Vienna, Austria, was instrumental in creating this...umm...thing. With an RC10 rear end, an MIP gearbox, Tecnacraft wheels, a Trinity 13-turn double motor and Andy's A-arms, this thing really moves. A VW bug body covers it up. Weird-o.



BLUE, BY YOU

The award for color-coordination goes to Marc Robin of Winnipeg, Canada. With his Clod doing the dirty work, his Bolink Eliminator can take it easy until race time comes around. With its Tekin 610 ESC and Cheetah front end, Marc's Eliminator really moves! Mods to the Clod include Trinity Power Shocks, a Tekin 300 ESC, Trinity Monster Stock Motors and adjustable pinion mounts.



A REALLY ROCKIN' RIDE

Steve "Doc" Wacholz of Palm Harbor, FL, sent us this picture of his cool Lynx II. Steve outfitted his ride with an LTO chassis, a split front crossbar, a Novak 410 MXC ESC, a Novak NER-2X mini receiver, a Futaba 132 miniservo, and a QuarterFlash Storm motor. When Steve isn't racing, he's a drummer for the band Savatage. His car's sponsor (Falcon) manufactures crankshafts and clutches for racing motorcycles and drum holding systems for groups like Living Colour, White Lion and XYZ. So I guess that you could call this a flyin' heavy-metal oval machine!



AMERICAN EAGLE

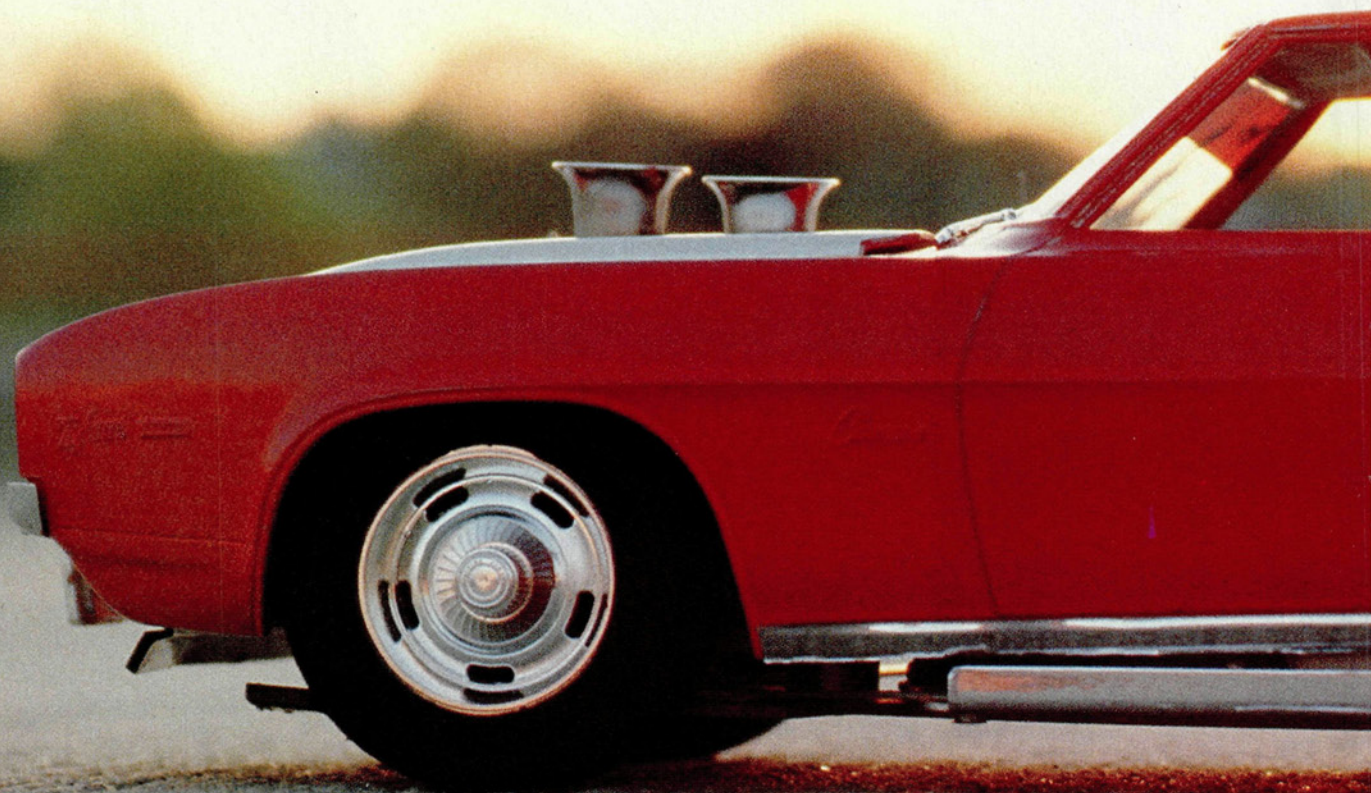
Darrell Tremblay of Lancaster, CA, proudly displays the red, white and blue behind his all-American Traxxas Blue Eagle. Darrell's truck has a Futaba radio system, a Novak T-1 ESC to control the juice and a killer airbrush job. Some neat details finish off a really sharp-looking truck.

DOWN (SOUTH) 'N' DIRTY

Frank Pupello of Tampa, FL, proves that dirt modifieds aren't just a Yankee thing. To an entirely scratch-built chassis, Frank added a Bolink Ford Probe body, but with the addition of a few details, he changed it into a Mustang. Like most dirt modifieds, all the aerodynamics (except for the 1-inch spoiler) are inside the body—essentially, the entire car is a wing! When Frank isn't racing, he's the equipment manager for the Tampa Bay Buccaneers.



HOME-BUILT PROJECT:



C.l.a.s.s.i.c

C

A

M

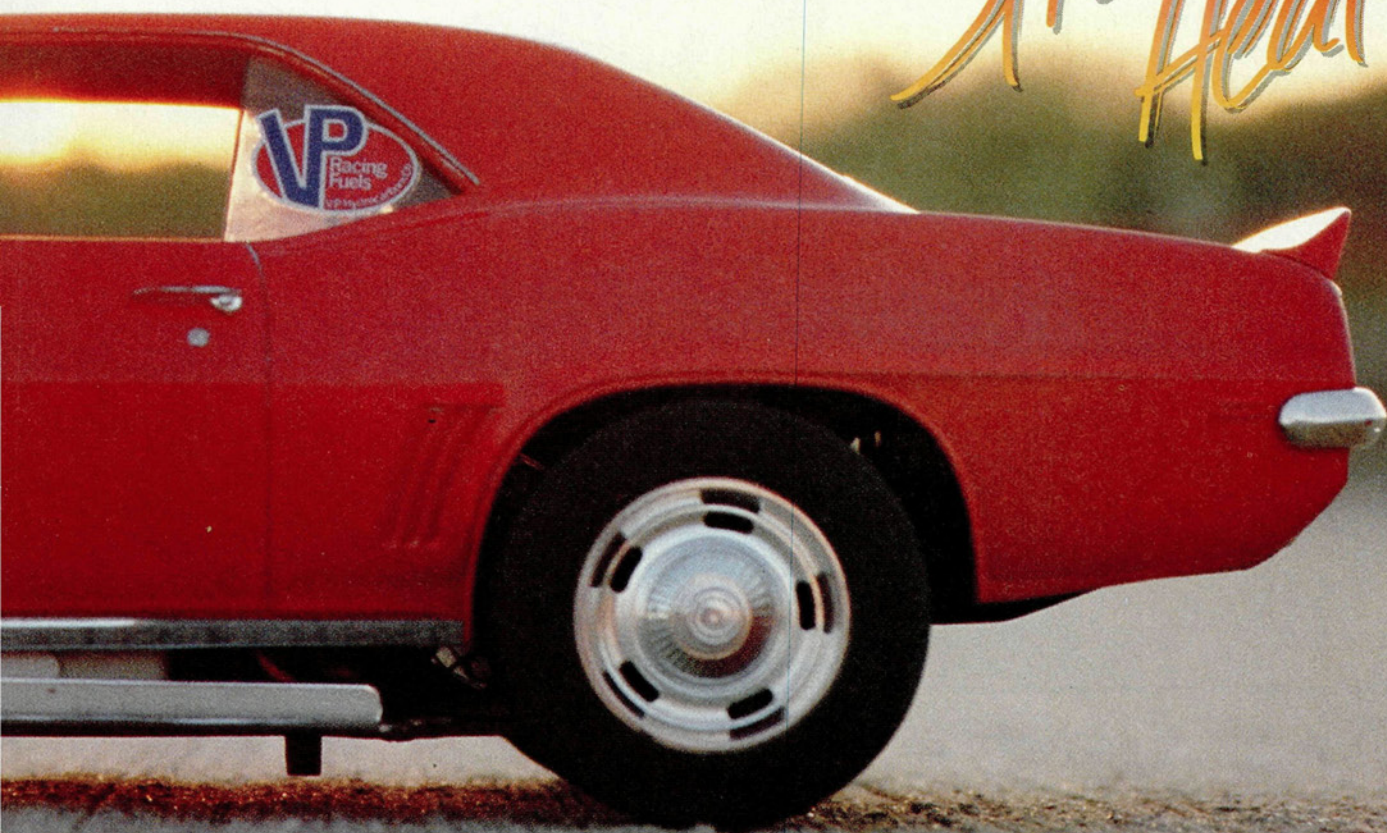


PHOTOS BY JOHN HUBER

a NYONE WHO has ever built a static plastic model will tell you that it takes hours of detailing and painting to achieve satisfactory results. You have to assemble the model *and* try to reproduce the lustrous finish of its full-size counterpart. What do you get for all that work?—a model that sits on your shelf and collects dust.

Luis Irizarry of the Bronx, NY,

Street Heat



A

R

by JOHN HUBER

O

wasn't satisfied with letting six weeks of work sit idle. He turned his favorite static model—a 1/12-scale Monogram* 1969 Camaro Z-28—into an R/C model.

ON THE MOVE

The first step toward "Monogram motivation" was to find a suitable chassis. Luis had an old Tamiya* 1/12-scale Renault

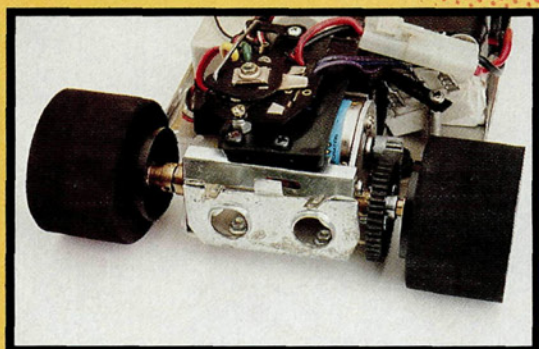
chassis, and with a few modifications, it fit perfectly. First, he narrowed the car's front and rear ends. For the rear end, he simply trimmed the axle, but narrowing the front end caused a problem: it weakened the suspension. To solve this, Luis made tin-strip support braces and ran them between the main chassis and the front uprights.

For running gear, Luis chose

an Aristo-Craft* Challenger 260 Sport radio, a Kyosho* Mega motor and a 7.2V hump-style battery pack (it was the only type that would fit). To prevent runaways, he made a 4.8V Ni-Cd receiver pack. For smooth operation, he installed ball bearings throughout, and he uses Tamiya's reliable three-step speed controller to regulate the power.

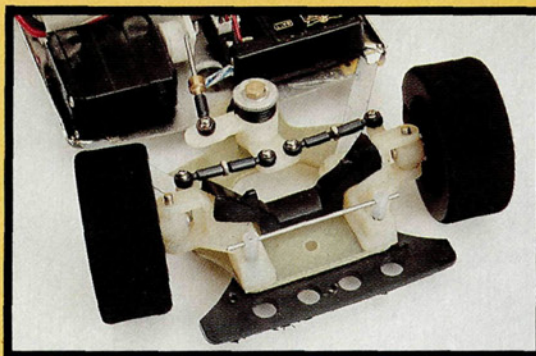
WAY TO PAINT!

It takes hours of work to make a plastic model shine, and you can't just spray paint it. Before Luis applied the red paint, he thoroughly cleaned and prepared the car's surface. Then he applied a coat of primer so that he could see small imperfections easily and



Fitting all the electronics into the Camaro wasn't easy; notice that the speed controller is mounted above the motor. The two protruding tabs on the chassis' rear end fit into slots that were cut in the body.

correct them. Using an automotive spray gun, Luis applied several thin coats of the Porsche red paint (code no. 027). This method produces an extremely smooth finish without any runs or drips. When the paint had dried thoroughly, Luis buffed the surface by hand (you can't use a



The chassis' front end had to be modified to accept the body. Two small tin strips were mounted onto the chassis to strengthen the front end.

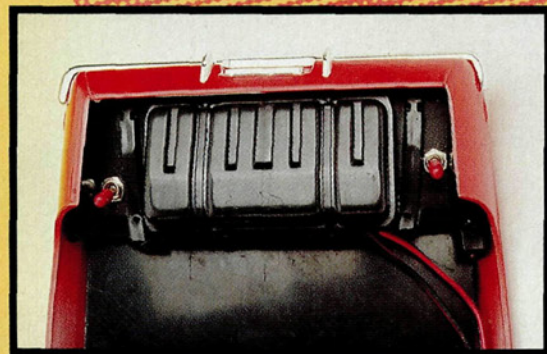
(i.e., the registration stickers on the windshield).

To make this car really sharp, Luis added headlights (modified to accept small 9V light bulbs) and fog lights made of small yellow LEDs (lights) that he had modified to run off 9 volts. He installed two 9V alkaline batteries in the plastic gas tank and, to operate the lights, he mounted two small toggle switches behind the rear wheels.

A FIT THAT MAKES THE FINISH

To mount the body to the chassis, Luis cut slots in the gas tank through which he inserted the two metal tabs on the chassis' rear. The front end simply rests on a piece of wire. The body fits tightly (you have to

than the Tamiya rims because the foam overhang enables him to use the kit-supplied hubcaps. To prevent them from being damaged or lost, he removes the caps when he runs the car. As you've probably guessed, this car doesn't have many miles on it; Luis only



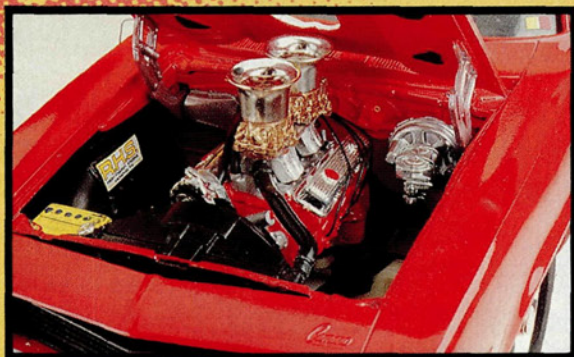
The headlights are powered by two 9V batteries that are mounted inside the gas tank, and they're operated by two toggle switches that are mounted behind the rear wheels.

runs it occasionally.

Luis's six weeks of hard work paid off when he entered his car in the 1991 WRAM Show: he won 1st place in the 1/12-scale category! Thanks, Luis, for showing others what a little hard work can accomplish.

**Here are the addresses of the companies mentioned in this article:*
Monogram Models Inc., 8601 Waukegan Rd., Morton Grove, IL 60053.
MRC/Tamiya, 200 Carter Dr., Edison, NJ 08817.
Aristo-Craft/Polk's Model Craft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.
Kyosho, distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820. ■

With the hood up, you can see the engine's details. Notice that the firewall and the wheel covers are intact.



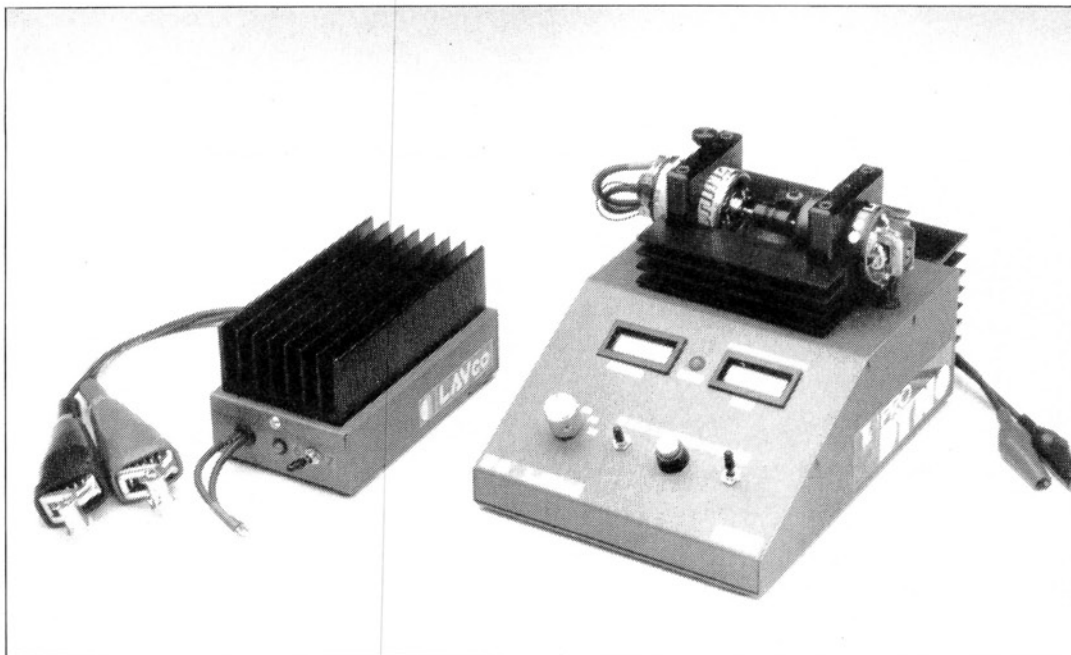
buffing wheel like those used on full-size cars), and he applied the kit-supplied Z-28 decals and those he made from scratch

pull its sides apart slightly to fit it over the electronics), but this helps to keep it in place.

Luis uses foam tires that are slightly larger

DYNAMOMETERS ARE AS much a part of full-scale racing as engines. The dyno allows an engine builder to analyze an engine's performance and to monitor the effects of minute changes. Fine-tuning an engine in a controlled environment is essential to obtain maximum performance, and the dyno is essential for this.

The methods we use to gauge R/C motors pale in comparison to those used for full-scale engines. Except for a few racing teams that can afford to drop five figures on a dyno, R/C drivers don't know how well their motors will run until a race. If a motor is tested at all, it's with a homemade setup, e.g., an unregulated power supply driving a motor driving a prop monitored by an electronic tachometer. This method (and others like it) can give most racers the information they

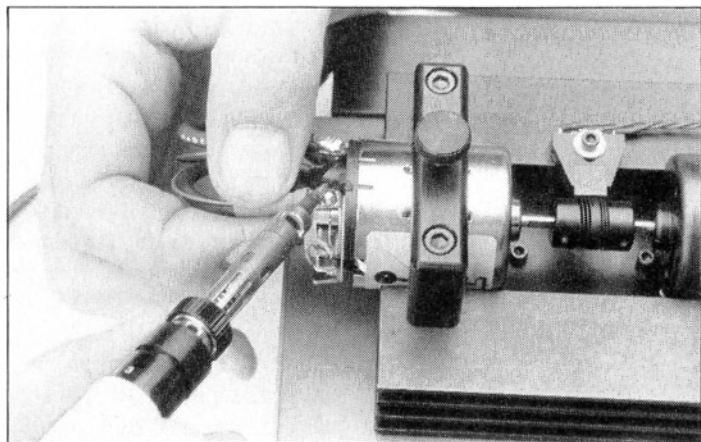


THE FUTURE IS HERE!

The new LAVco* Pro Dyno represents the future of electric motor dynos; a time when team motor tuners and factory drivers will be able to monitor their motors' performances so closely that they'll know exactly how a motor will perform before it's ever been driven on the track. Even minor changes in the motor's configuration, e.g., to brushes, springs or timing will be easily and accurately monitored.

LAVco PRO DYN0

b y S T E V E P O N D



Each time a motor is tested, the leads from the Dyno must be soldered to its endbell. The use of connectors or alligator clips will adversely affect readings.

need to obtain a decent performance, but motor builders need more precise information to coax that extra 10 seconds of run time, or to shave 1/10 second off their lap times.

The future is here.

The LAVco Pro Dyno uses space-age circuitry to regulate all of the variables that made

previous dynos inconsistent. By electronically regulating voltage and resistance across the field of the 70-turn custom-load motor, this precision motor tester gives consistently accurate readings. Motors can be tested at one of three preset voltage levels that were designed to simulate the average voltage of a 4-, 6-, or 7-cell pack.

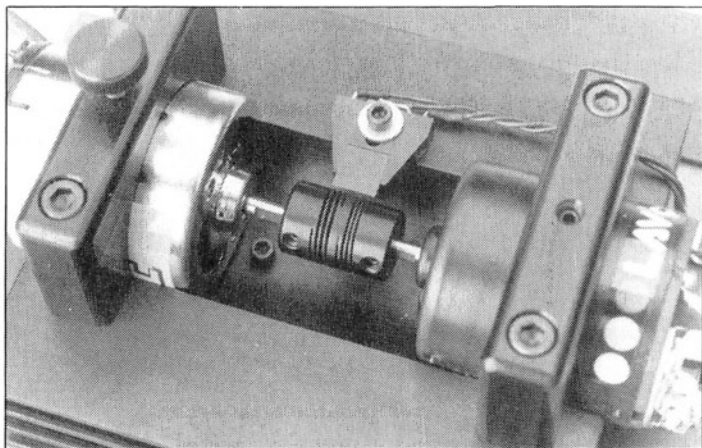
Other features of the Pro Dyno include digital tach and power meters; a "momentary button switch" activator; an infrared sensor to measure true digital rpm; extruded heat sinks to cool the motor test bed and internal electronics; load settings that range from 10 to 30 amps in 5A increments; and LAVco's trademark brushed, anodized-aluminum housing.

The Pro Dyno runs off a

DC voltage source, which can be an adjustable power supply or an appropriate Ni-Cd battery pack. Running the Dyno with a power supply can be

**"THE NEW
LAVCO*
PRO DYN0
REPRESENTS
THE FUTURE
OF ELECTRIC
MOTOR
DYNOS"**

D Y N O - M I T E !



The machined-aluminum flex coupling doubles as a pick-up for the tachometer's infrared sensor.

difficult because, even though the highest load setting on the dyno is 30 amps, the surge created when it's activated can jump to 100 amps—enough to trip the breakers or fuses in most power supplies. There are a few suitable power supplies, but they're very expensive. A Ni-Cd pack can be used, but it must be assembled to suit each voltage setting, and it only lasts a few minutes before it needs recharging. (It's a good idea to have a few old packs exclusively for the Dyno.)

This is how many cells you'll need to run the Pro Dyno; it depends on what you'll be testing:

For:	You'll need a
4-cell testing	5-cell battery pack
6-cell testing	7-cell battery pack
7-cell testing	8-cell battery pack

LAVco also makes a voltage-regulating box (not included with the Dyno) that lets you run the Dyno off a non-adjustable 12V to 15V power supply (provided it's capable of high amp loads), or a 12V power source, such as an automotive battery.

LE TEST

Attach the motor to the Dyno by sliding the motor's shaft into the aluminum flex cou-

pling (a setscrew fastens the coupler to the motor shaft) and tightening the thumb-screw on the motor bracket to hold it in place. Then, solder the Dyno's test leads to the appropriate motor tabs. All that soldering can be quite a task, and this may lead you to

consider installing connectors or alligator clips on the test leads. *Don't do it!* An alligator clip or a connector can dramatically reduce the accuracy of the Dyno's readings. Altering the Dyno in this manner would completely negate the advantages of having such a precise motor tester. When you've finished the soldering, connect the Dyno to a power supply, and you're ready to go.

I hooked the Dyno to a 7-cell Ni-Cd battery, which the instructions recommended for 6-cell testing. The Ni-Cd produced accurate results, but it needed recharging within a couple of minutes. At that point, I connected the LAVco voltage regular to a Stormer*

T-70 power supply. The surge created by the Dyno tripped the breaker in the power supply (as I thought it would)—even when testing a stock motor at 10 amps. I now power the Dyno with a 12V motorcycle or car battery and the voltage-regulator box. The battery provides clean DC power with enough capacity for an hour or so of testing.

Now, push the button and hold it down while the Dyno's readings stabilize. Using data from the infrared sensor and the load motor, the Dyno provides power and rpm numbers. It takes a little while to link the numbers the Dyno generates with how the motor will perform, but you'll soon be able to estimate run time, top speed, gear ratios and deterioration of performance with reasonable accuracy.

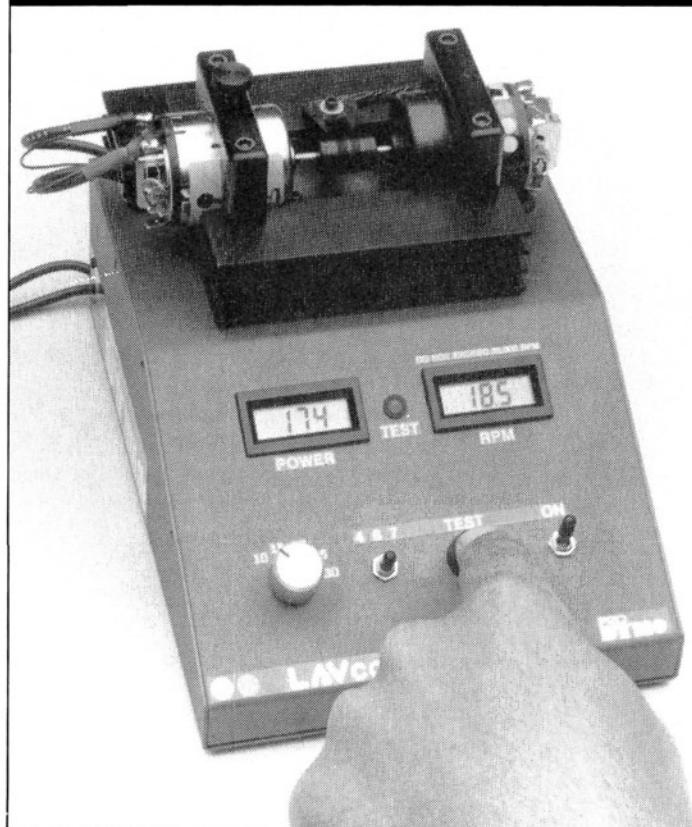
READING BETWEEN THE LINES

If the numbers on the Dyno haven't stabilized after 10 seconds, there may be a problem. A few things may cause erratic results: brushes that haven't been broken-in or a worn (out-of-round) commutator can cause the Dyno numbers to bounce around a little; improper alignment of the motor being tested and the load motor can also cause a drastic reduction in accuracy; and debris in the aluminum flex coupling can hamper the proper operation of the infrared sensor and affect the tachometer. A weak battery will also affect the results, but the Dyno has a test light to indicate whether or not the battery's voltage level is sufficient.

MOTOR ANALYSIS

The Dyno's power rating indicates a motor's efficiency. For example, if your motor

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TRACK REPORT

Associated

by FRANK MASI

WHAT CAN BE said about Associated's* RC10 that hasn't already been said? Following its introduction in '84, it instantly dominated R/C off-road racing—setting a record for victories that will probably never be broken. But off-road was just the beginning. Dirt-oval racers and on-road racers were soon running—and winning with—modified RC10s! Two World Championships ('85, in the talented hands of Jammin' Jay Halsey; and '89, run by Japanese sensation Masami Hiro-saka), and numerous ROAR national and regional titles later, the RC10 is still going strong. The latest version of Associated's dirt dynamo is called the



Team Car, and it incorporates many of the subtle changes that the Team drivers have been using to give them the edge over other world-class competitors.

REMARKABLE REFINEMENTS

When you compare the Team Car with the original RC10, you might be surprised to find that, apart from the Stealth transmission (more on that later), the two are remarkably similar. At a glance, it seems that most of



FACTORY FLIER!

team car

the major chassis components remain unchanged, but on closer inspection, you'll see the small refinements made over the years.

Starting up front, you'll find the in-line steering blocks from the RC10 Graphite. This brings the front tires' pivots closer to the center of the rims, and this minimizes tire scrub (lateral movement of the tire over the track's surface).

The RC10 Graphite's longer front A-arms have also been incorporated into the Team Car. This was done not only to minimize tire scrub, but also to widen the car's stance (which generally makes a car more stable). When Associated designed the RC10 Graphite, they realized that the longer A-arms changed its geometry enough to warrant a new shock tower. Naturally, this tower is standard equipment on the Team Car.

Rounding out the front end is a set of Associated's brand-new, .71-inch, hard-anodized Team shocks.

One version of the Team Car uses the T-6 aircraft-grade, stamped-aluminum tub that was used on the first RC10. The chassis—as well as the front kick-up plate and brace tubes—gets a “trick” black anodizing instead of gold. The Team Car I tested had a graphite chassis plate that was originally developed for the RC10 Graphite.

It really takes a sharp eye to see what's different at the back of the Team Car, but if you look hard enough, you'll see that the new hub carriers have 1.5 degrees of toe-in built in. This, combined with the additional 1.5 degrees molded into the rear A-arm mount, makes for a total of 3 degrees toe-in.



TEAM CAR

(Continued from page 37)

THE SECRECY IS OVER!

R/C racers worldwide are rejoicing: the Stealth is here!—well, some of it, anyway. Never in the history of R/C racing has there been more secrecy

than that surrounding the Associated prototype 2WD car that dominated the '89

Worlds.

Though details on the car's internal makeup still remain a mystery, Associated has finally released its Stealth transmission to eager racers. The Stealth is available as an after-market upgrade for the RC10, but the Team Car is the first to have it as standard equipment.

ADDITIONAL EQUIPMENT

The Team Car kit includes universal-joint drive shafts; Associated's light, one-piece TQ rims with TQ22 mini-spike tires in the rear and TQ72 ribbed tires up front; and turnbuckle tie rods throughout. Topping off the Team Car is a sharp new Viper body.

ASSOCIATED ASSEMBLY

My very first RC10 came with two booklets—one containing written instructions and the other showing photos. I had to sit there with both books open as I tried to figure out

Above: It's difficult to mount radio gear onto the graphite chassis because it's an inch narrower than the aluminum-tub chassis.

* * *

which paragraph went with which photo. Times sure have changed! The instructions for the Team Car are among the best in the industry: clear, concise, written instructions and intelligible photos that correspond perfectly—nice job, Associated!

■ **The front suspension.** When you assemble the front A-arms, the block carriers and the steering blocks, take the time to ensure that all the parts move as freely as possible—*no binding!* The nylon suspension parts don't fit as precisely as they should. To eliminate binding in the A-arms, run a no. 30 drill bit through the hinge-pin holes. The more attention

ASSOCIATED ELECTRICS TEAM CAR SPECIFICATIONS

Type 2WD off-road
Scale 1/10
Sug. Retail Price \$345

DIMENSIONS:

Overall Length 15 inches
Width 9 inches
Wheelbase 10.5 inches
Front Track 8.5 inches
Rear Track 8 inches

WEIGHT:

Gross (with battery) 50.062 ounces

BODY:

Type Single-seat buggy
Material Lexan

CHASSIS:

Type One-piece plate
Material Graphite

DRIVE TRAIN:

Primary Pinion/spur
Transmission Gear
Differential(s) Ball diff
Bearings/Bushings Sealed ball bearings

SUSPENSION:

Type (f/r) Independent A-arm
Damping (f/r) Oil-filled, coil-over shocks

WHEELS:

Front: Type one-piece nylon
Dimensions (DxW) 2.1x.625 inches
Rear: Type one-piece nylon
Dimensions (DxW) 2.1x1.25 inches

TIRES:

Front TQ-72 ribbed
Rear TQ-22 mini-spikes

ELECTRICS:

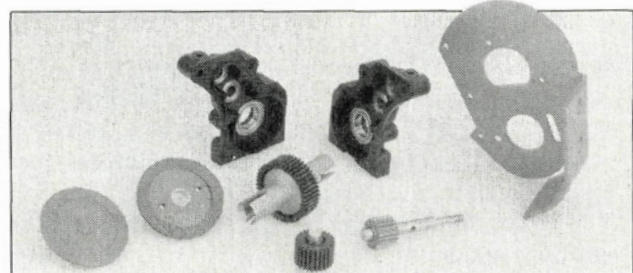
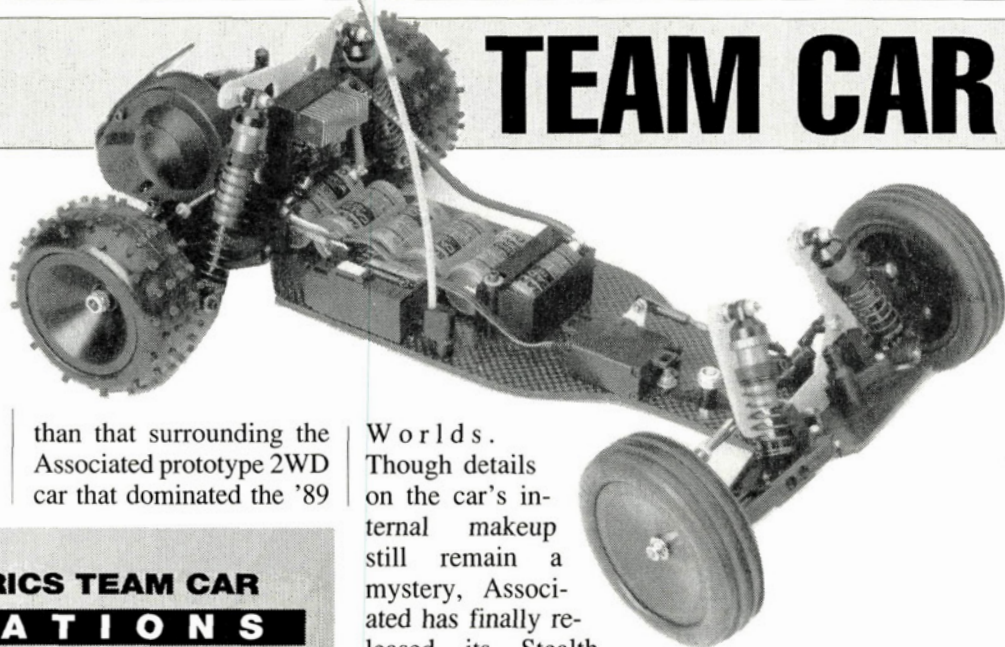
Motor, Battery, Speed Controller Not included

OPTIONS AS TESTED:

Associated 25-degree caster blocks; short green front springs and long green rear springs; Reedy Mr. R Ultra Series modified motor; Airtronics Caliber 3P FM radio and 94141 servo; Tekin* 411P ESC; RCPS titanium tie rods and hinge pins.

COMMENTS:

The Associated Team Car is as close to what the factory drivers are using as you can get. The Stealth transmission performs smoothly, and the new shocks seem to work well. A little care taken when assembling the car produces great results in the performance department. Some of the tolerances on the suspension parts are a little off, and some effort is needed to make them work freely, but overall, the finished car's performance outweighs the building problems.



The key to the Team Car's success is its light, highly efficient Stealth transmission.

PHOTOS BY STEVE POND

TEAM CAR

you give to details when you assemble a machine of the Team Car's caliber, the wider the gap between you and less meticulous competitors will be. With the front suspension nearly complete, it's time to install the steering linkage and the servo-saver.

■ **The steering linkage servo-saver.** Because they sometimes break, some racers shun the stock bellcranks in favor of after-market hardware. Ulti-

utes. I was taking my time, I might add!

At several of the tracks I frequent, I've looked at RC10s equipped with Stealth trannies, and I've noticed that many owners run with their diffs much looser than they should be. Unlike most previous transmissions, the Stealth's differential action and torque limiting are completely separate functions. Almost every other ball-diff transmission relies on the diff itself to limit

control is adjusted at the slipper clutch.

REAR-DRIVE JIVE!

■ **The rear suspension.** When you've bolted the rear bulkhead and the transmission to the main chassis, it's time to work on the rear suspension. Anyone who has ever assembled an RC10 (quite a few have!) will instantly recognize the Team Car's rear suspension parts, but there are subtle differences between the Team Car's rear-suspension mounts and hub carriers and those of the original RC10. On the Team Car, it's critical that the mounts and carriers designated as being for the car's left side are attached to that side, and the right-side parts must be attached to its right side. The suspension mounts are molded to provide 3 degrees of anti-squat and 1.5 degrees of toe-in, and the hub carriers have another 1.5 degrees to give a total of 3 degrees of toe-in. Anti-squat is the pivot angle of the suspension arm in relation to the chassis: the greater the anti-squat, the less the rear of the car will drop under heavy acceleration and, generally, the more stable and "sure-footed" takeoffs will be.

Rear-wheel toe-in will usually keep the rear "locked in" when the car is driven hard out of turns, so it's essential to position these components correctly. (But remember that too much toe-in slightly reduces overall straight-

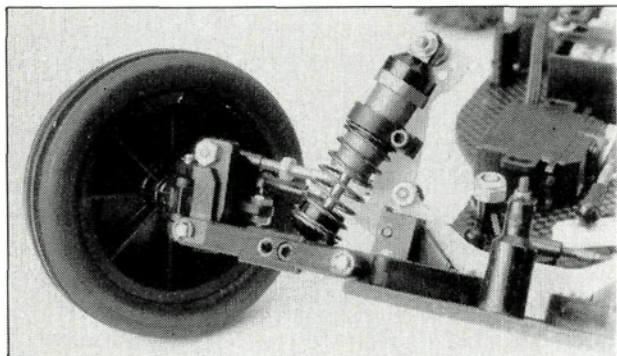
away speed.)

■ Universal drive shafts.

This is another area that requires close attention to detail. To avoid having excessive play between the drive shafts and the hub carrier bearings, you must install the supplied washers on the shafts. You're told to put three of the washers onto the drive shafts before you install them in the hub carriers, and then to put at least one more between the bearing and the roll pin. To be sure that the three washers initially installed on the drive shafts keep the shafts at a proper distance from the transmission outdrives, assemble the drive shafts according to the instructions, and spin the transmission while moving the rear A-arms through their full range of travel. It should spin freely without stopping. If it does stop, remove one of the three washers and spin it again; repeat this procedure until the transmission rotates freely through the A-arms' full range of movement. When you've done this, add washers to the outside of the hub until play between the roll pin and the bearing has been minimized. As with the front suspension, there should be no binding in the rear A-arms.

SHOCKING NEWS!

Besides the Stealth transmission, the biggest difference between the Team Car and its predecessors is the addition of Asso-



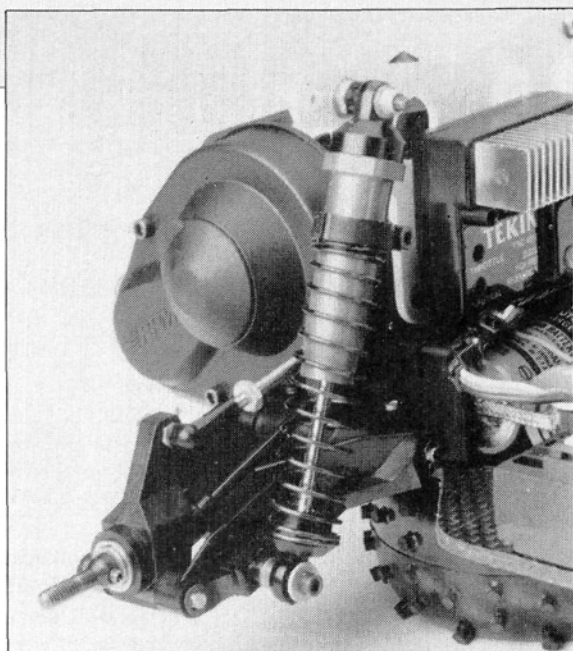
The Team Car's front suspension comes from the RC10 Graphite—wide front A-arms, in-line steering blocks and revised shock tower. Also up front you'll find 0.71-inch versions of Associated's Team shocks. To save weight and increase durability, RCPS Titanium tie rods are used throughout.

mately, it's your choice, but I decided to stay with the stock setup. If it's good enough for Cliff Lett, it's good enough for me! One piece of advice: wrap at least one small tie-wrap around the servo-saver arm; it will increase the car's overall steering response.

■ **The Stealth transmission.** The most important advice I can give is that you should follow the instructions to the letter! The Stealth went together easily in around 30 min-

torque by slipping, but this accelerates the wear of the primary diff parts and makes frequent rebuilds necessary. A properly set up Stealth diff shouldn't slip under any circumstances.

When you adjust the diff, do exactly what the instructions tell you: tighten the adjustment screw until you feel the diff spring bottoming out; then back the screw off by approximately one-eighth to one-quarter of a turn. This is the final adjustment! After that, torque

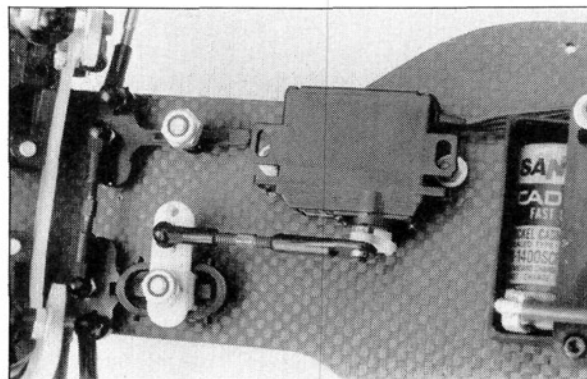


The Team Car's rear A-arm mounts have the same 1.5 degrees of toe-in as the earlier RC10, but the rear hubs add another 1.5 degrees (total of 3 degrees). The new, hard-anodized, Teflon-coated shocks are a significant improvement on previous versions. RPM's RC10 gear cover keeps out dirt and makes it easy to adjust the slipper clutch.

ciated's new hard-anodized, Teflon-coated shocks. They're a radical departure from the RC10's Gold shocks in that you insert their shaft seals from inside the shock body, instead of from outside it. A special tool is provided for this.

A few words of advice: pay close attention to Figures 97 and 98 on page 30 of the instruction manual; they show the correct way to install the split washer that holds the shock seals. Unlike the old shocks, the new shock bodies are machined from one side only, and this allows them more precise tolerances (fit). As I understand it, the threads that secure the shock cap on the top of the shock body are of a slightly finer pitch than those on Associated's previous shock body, so the existing aluminum caps wouldn't fit properly. To

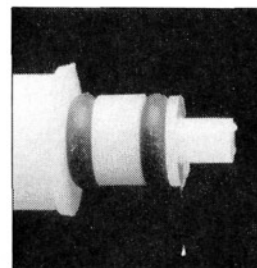
keep down the cost of the kit, the earlier Team Cars had nylon caps that fit the new threads. Nylon caps are less expensive to manufacture than aluminum ones, but now that Associated has the appropriate tooling, black-anodized aluminum caps are included in the kit. Many Team drivers still prefer nylon caps, though; if you have aluminum caps, disregard Figure 102 on page 31 in the instruction book.



Airtronics' new 94141 servo has the torque of a large servo, and the speed of a high-speed servo. Convenient mounting ears eliminate the need for separate servo posts.

A few final words on the shocks: Associated shocks are what's referred to as "emulsion" shocks. They're designed to allow air to mix with the shock oil. When properly assembled and filled, there *should* be a little air in each shock (the longer the shock, the more air). The oil displaced by the shaft as it enters the body needs somewhere to go and, unlike oil, air can be compressed, so before you run your car, just pump the shocks a few times to "emulsify" (foam) the oil. This also prevents the shock piston from hitting any air pockets inside the shock body.

When I mounted the rear shocks, I had to put an 1/8-inch spacer behind the lower pivot balls to attain the proper operating angle. When the rear shocks are mounted according to the instructions, their bottoms are angled toward the car's rear. This means that the shocks are angled in a direction that's opposite the angle in which the suspension arm will travel. This binds the upper shock



A unique feature of Associated's new Team shocks is the method used to install the shock seals. The seals' components are arranged on the provided installation tool in the proper order, then the entire assembly is "shoved" into the body from the inside.

mounts and gives progressively harder damping. The 1/8-inch spacer brings the shocks to a more upright position and lessens these problems.

RADIO GEAR

For radio gear, I chose equipment that I thought would be on a par with the Team Car. The Airtronics* Caliber 3P FM transmitter fit the bill perfectly. Controlled by microprocessors, this 3-channel system allows a staggering number of adjustments that make tuning your throttle and steering response a snap. For lightning-fast steering response, I chose the Airtronics 94143 servo, which provides good torque and quick transit times. The 94143 also has mounting tabs that eliminate the need for separate mounting brackets.

Although I love building R/C models, painting Lexan bodies doesn't head my list of favorite tasks. Fortunately, I received a beautiful custom-painted

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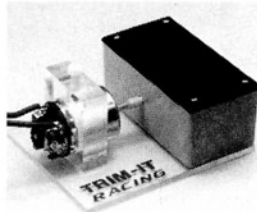
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TEAM CAR

* * *

THE KEY TO THIS CAR'S SUCCESS IS THAT IT'S A COMBINATION OF NEW AND REFINED PARTS THAT WORK WELL AS A TOTAL PACKAGE.

Viper body from Curtis Hustings (Associated's master machinist and, apparently, its "paint-meister"), and I only had to trim and mount it. Whew!

INITIAL SET-UP

This car practically begs you to take it racing! Although I intended to test the Team Car just as it came out of the box, I gave in to temptation and set it up as close to Cliff Lett's '90 ROAR Nats RC10 as I could.

I started by changing the front caster blocks from the stock 15 degrees to 25 degrees. (I used Associated's 25-degree caster blocks; part no. 6215). Increasing the caster makes the car steer a little better into turns, and it makes the car easier to drive hard out of turns.

I replaced the kit's silver springs with Associated's short green fronts (part no. 6494) and long green rears (part no. 6480). I think that the softer green springs make the car a little more forgiving on bumpy tracks and prevent the handling from being "twitchy." Following Cliff's setup, I filled the front shocks with 25WT silicone shock oil and put straight 30WT oil in the rears. Associated doesn't make a 25WT oil, but you can mix your own by blending 20WT and 30WT in a ratio of approximately 50:50.

To start, I adjusted the front wheels so that they were parallel (i.e. there was neither toe-in nor toe-out), and I added between 1 and 2 degrees of negative camber (tops of the tires leaning inward) to both the front and rear tires.

For the ride height, I adjusted the shock-spring collars so that the rear A-arms were parallel with the ground, and the front end sat about

1/4 inch lower than full height. Always set static adjustments (ride height, camber and toe-in/out) after you've installed the battery and the motor.

I replaced the stock turnbuckles with a titanium set from RCPS* (part no. 710). They're lighter and substantially stronger than the steel turnbuckles included with the kit. Similarly, I put aside the kit's steel hinge pins in favor of RCPS titanium ones (part no. 610). They aren't really necessary, but, again, they're stronger and lighter than the stock steel pins.

AT THE TRACK!

With a Reedy* Mr. R Ultra Series modified, 16-turn, triple motor bolted to the Stealth tranny and five fully charged 6-cell 1400mAh SCRs tucked under my arm, I headed for my favorite indoor track—Queen's Off-Roaders Raceway in Long Island City, NY. It's often very difficult to set up your car for this track, because its clay surface sometimes gets packed down hard, and this leads to poor traction.

For the first minute's running, I followed the instructions and set the slipper clutch to be very loose because I wanted to seat the clutch disk properly. After tightening the clutch so that the car slipped for about 1 foot when it accelerated from a dead stop (you should never need much more slippage than this), I headed back to the drivers' stand.

During the tests, it became apparent that I had chosen the wrong servo for off-road racing; the servo gears self-destructed after a few laps! A quick call to Airtronics

(Continued on page 78)

TRUCK STOP

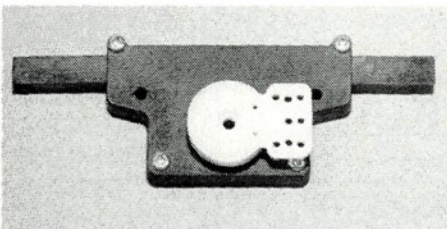
by DAVE SPROUL

Hop-ups & gas trucks

WELCOME TO another installment of "Truck Stop." This month, I'll tell you about some monster-truck-related hop-up parts that you may find interesting.

PRO-STEER

The Pro-Steer rack-and-pinion steering system from Winning Edge Products* is available as a conversion kit for certain off-road and on-road cars and as a universal system for monster trucks. I recommend it to those who'd like to eliminate unwanted play in their steering system. Made with composite plastic materials and precision ball bearings, the sturdy Pro-Steer operates very smoothly,

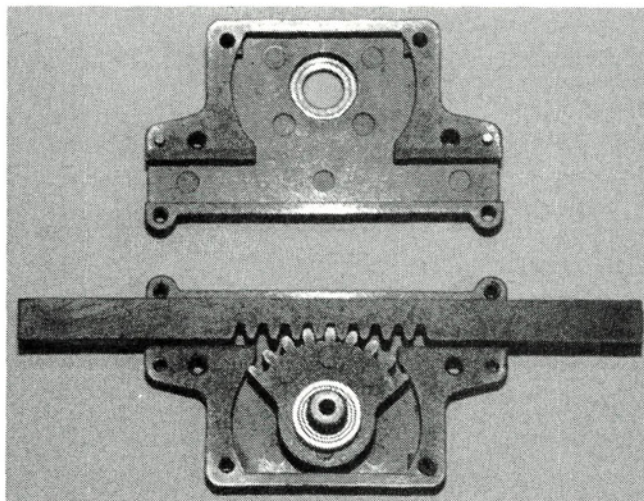


The Pro-Steer rack-and-pinion steering unit can be used with Futaba-type servo arms or Kimbrough servo-savers.

and its input shaft is compatible with any Futaba-style servo arm or servo-saver. The Pro-Steer may be of special interest to owners of dual-motor, 4WS heavy hitters (such as Tamiya's* Clod Buster and Kyosho's* USA-1) who may have had problems with their stock steering components. I plan to install one in my USA-1, but it's definitely not a "drop-in." As soon as I figure out the easiest and best way to install it, I'll pass the information along to you.

SASSY CHASSIS

Sassy Chassis* produces an aluminum chassis for 2WD Kyosho trucks. It's basically the same as the USA-1 chas-



With the cover removed, you can see the bearing-supported rack and pinion. This setup prevents steering slop.

sis, but it has a slightly different mounting system and chassis braces, and bellcrank steering components are included. This is an addition to the line of aluminum chassis kits that Sassy makes for most popular monster trucks. Sassy also recently introduced the SST Clod Buster chassis. It allows you to use dual rear axles and three Clod gearboxes with 6WS! You may also want to check out Sassy's "missing link" replacement steering bellcrank for the Clod Buster. It eliminates slop and allows for infinite "adjustability."

THORP MANUFACTURING

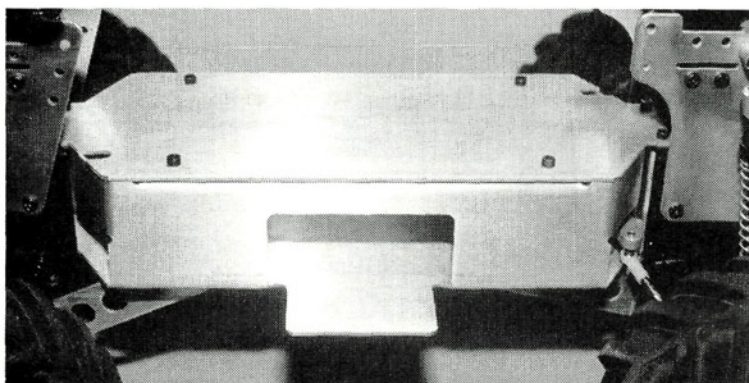
Fully adjustable ball diffs with telescopic drive shafts are available from Thorp Mfg.* for the Tamiya Blackfoot, the King Cab/Hi-Lux and many other mon-

ster trucks. I've used Thorp parts in my USA-1, and I'm impressed. I prefer telescopic axles to dogbones, but if you prefer dogbones, Thorp makes ball diffs that accept these as well.

MAXTRAX

MaxTrax* recently introduced the cantilever suspension system for Kyosho's USA-1 (PDI* is working on a similar system for the Clod Buster, and it may be available through MaxTrax). Although the stock suspensions on these trucks work very well, this system is still an improvement. The materials used in the kit are of the highest quality: heavy-duty aluminum and stainless-steel components are used throughout. It accepts most 4-inch shocks, and it's totally adjustable (including ride height and shock throw). The bellcranks are equipped with Oilite bushings, but they can be upgraded with ball bearings for smoother operation. The cantilever system was patterned after similar suspension systems found on full-size monster trucks,

(Continued on page 46)

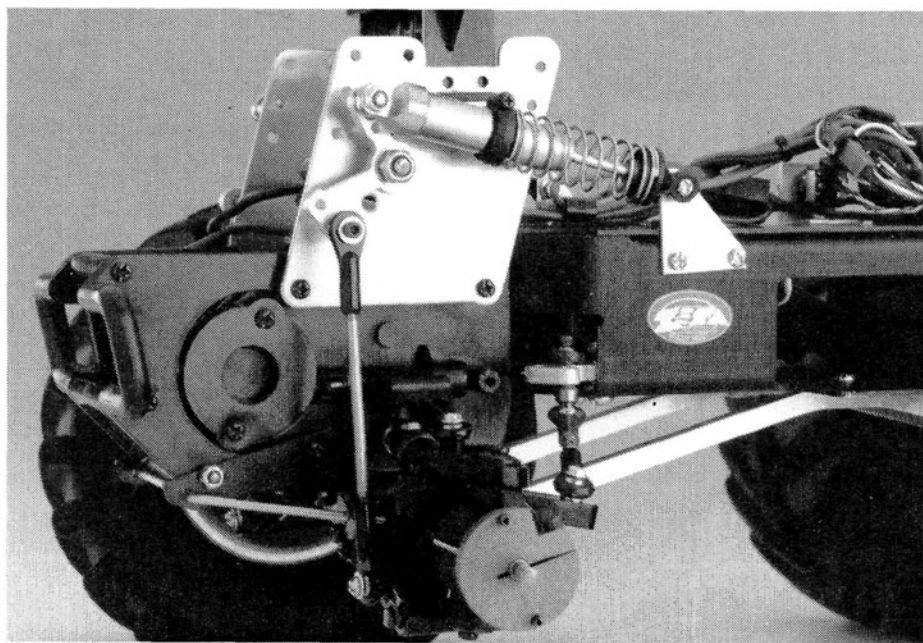


Sassy Chassis' new aluminum chassis for Kyosho 2WD monster trucks is substantially more rigid than the stock unit and includes bellcrank steering.

TRUCK STOP

(Continued from page 44)

The new MaxTrax USA-1 cantilever suspension system replaces vertical shocks and greatly improves handling and durability.



i.e., the Bigfoot VIII and the Carolina Crusher. Handling is superb; it feels more like a stadium truck than a monster truck. If you want superior handling and the latest high-tech accessory for your Clod Buster or USA-1, check it out!

While I'm on the subject of monster trucks, I want to recommend some servos. The huge tires on a monster truck can make its steering less responsive, so it's important that you use a heavy-duty steering servo. The Futaba* S9301 and the Airtronics* 94738 have the high torque that's necessary to handle monster trucks, whether you're racing, pulling, or just backyard-bashing. Another helpful tip, especially if you race on obstacle courses, is to install CRP* foam inserts in the tires. They may add a little weight, but they prevent the treads from collapsing and improve contact with the track's surface.

GAS BLAST

Are you bored with your electric R/C vehicles? Check out the new gas-powered trucks! Shumacher* offers a nitro-powered version of the Shotgun racing truck, and it comes complete with an Irvine .15 engine. If off-road stadium trucks are your thing, Kyosho's Outlaw Rampage should really turn your crank. This 2WD speed demon is ballistic! An O.S. Max .12 CZ-R engine with a pull-

start is included in the kit. With their extended run times and exceptional performances, these things are pure fun!

Speaking of "fun," let's talk about the soon-to-be-released USA-1 Nitro Crusher. This massive monster truck has a heavy-duty aluminum chassis, eight oil-filled, coil-over shocks, a 4WD system with three diffs and a .21-size engine for pure nitro-burning excitement. Though not as fast as the Outlaw Rampage, the Nitro Crusher can go anywhere and climb anything. It's virtually unstoppable! Check with your local hobby dealer for details, and watch for a *Radio Control Car Action* "Track Report" in the near future.

I almost forgot! Kyosho has also introduced "Heavy Metal"—the first-ever R/C monster tank kit. It has a slightly modified Blizzard Snow Cat chassis and

a new Ford van body with hot graphics.

We R/C truck enthusiasts certainly have a host of new products to tempt us (and our wallets!). New truck kits are available from Team Losi* and Traxxas,* and the RC-10ST—Associated's* new racing truck—will be released soon. After-market suppliers must be staying up nights to develop the nifty new accessories on which we spend our cash. Isn't this hobby fun? All I can say to the manufacturers is, "Keep it coming; we love it!" That's all for now. Stop by the "Truck Stop" again on your next cruise through *Radio Control Car Action*!

**Here are the addresses of the companies mentioned in this article:*

Winning Edge Products, 1 Bert Dr., Unit A-11, W. Bridgewater, MA 02379.

Tamiya; distributed by Model Rectifier Corp., 200 Carter Dr., Edison, NJ 08817.

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.

Sassy Chassis, 906 Ridgewood Dr., Cary, IL 60013.

Thorp Mfg., 4054 E. Mission Blvd., Pomona, CA 91766.

MaxTrax; distributed by Great Planes Model Distributors.

PDI, 16922 N.E. 124th St., Redmond, WA 98052.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

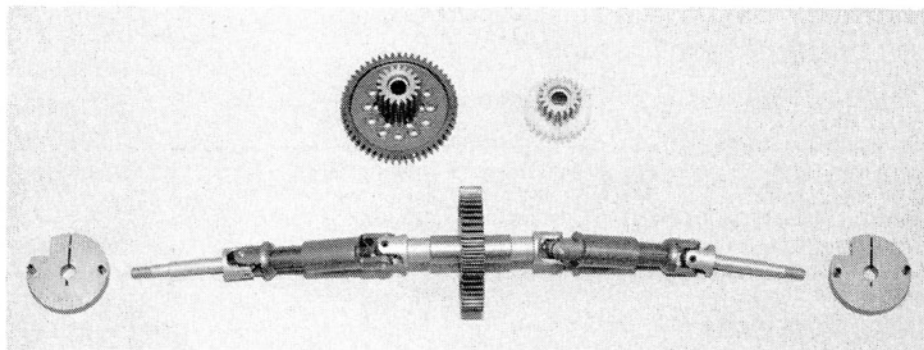
CRP, 8784 Plata Ln., Atascadero, CA 93422.

Schumacher Inc., 6302 Benjamin Rd., Suite 404, Tampa, FL 33634.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

Traxxas Corp., 12150 Shiloh Rd. #120, Dallas, TX 75228.

Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626. ■



Thorp's telescoping axle kit with ball diffs offers improved performance and reliability for the USA-1 and most other popular monster trucks. Aluminum wheel hubs are also included.

piston- pounding pickup

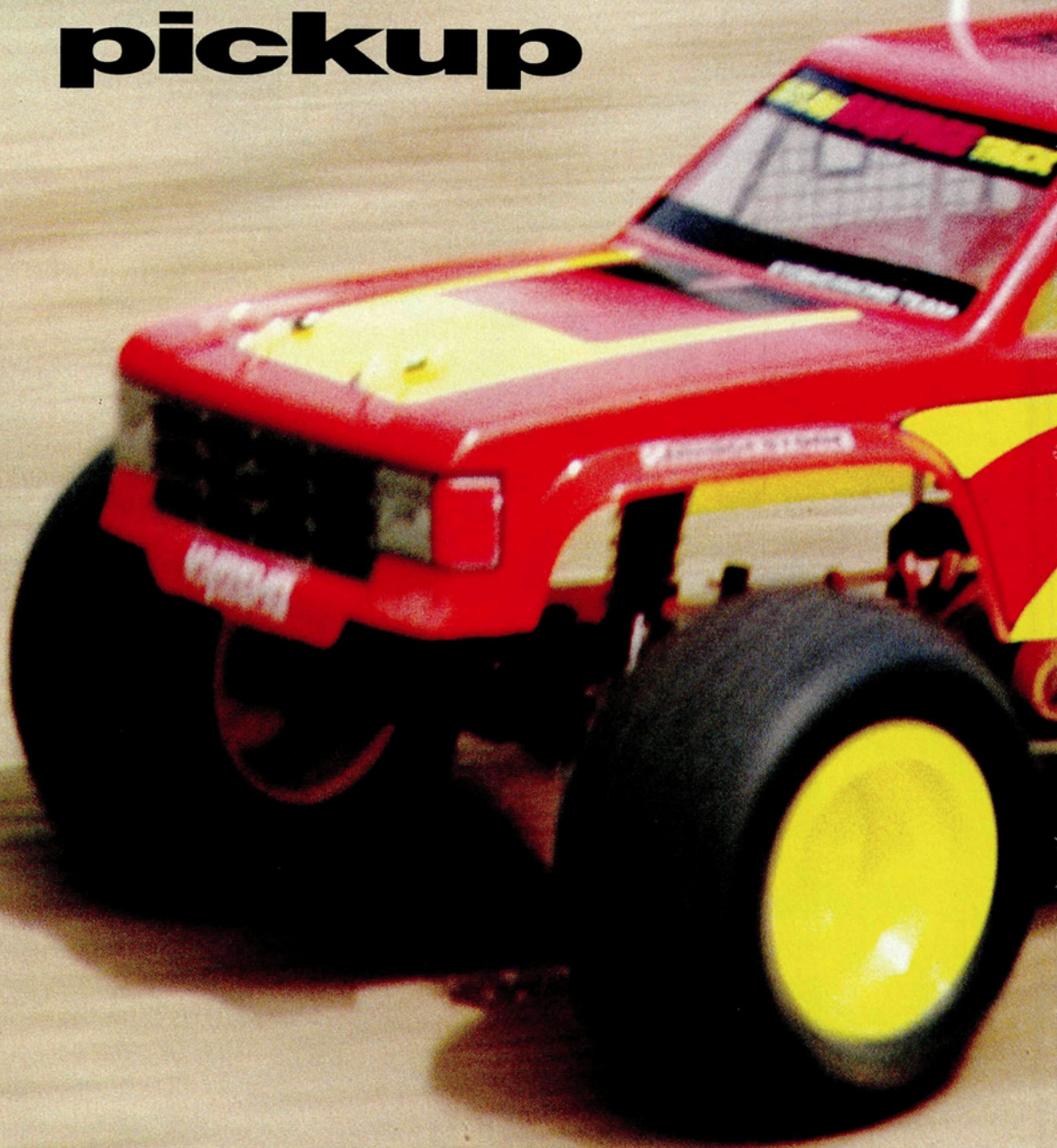
G AS-POWERED R/C cars are undoubtedly some of the most realistic, exciting vehicles in our hobby, and

1/10-scale R/C stadium-truck racing offers explosive, action-packed competition. Kyosho* has succeeded in making R/C racing trucks

PHOTOS BY JOHN HUBER



by ED BYRON



k yosho

outla

even more realistic and exciting by introducing its gas-powered Outlaw Rampage 1/10-scale racing truck.

When I discovered that I'd have an opportunity to test the Outlaw Rampage, I thought about how a gas-powered version of

Kyosho's Ultima Outlaw would perform—one word kept coming to mind: realistically.



Rampage

specifications

Type ... Gas-powered racing truck
Scale 1/10
Sug. Retail Price \$399.95

DIMENSIONS:

Overall Length 14.75 inches
Width 11.4 inches
Wheelbase 10.6 inches
Front Track 9.25 inches
Rear Track 9.4 inches

WEIGHT:

Gross (without fuel) 3 pounds,
8.91 ounces

BODY:

Type Ford pickup
Material Polycarbonate

CHASSIS:

Type Pan
Material Aluminium

DRIVE TRAIN:

Primary Spur/pinion
Transmission Belt/gear
Differential Gear
Bearings/Bushings Bushings

SUSPENSION:

Type (f/r) Lower A-arm, upper
control link
Damping (f/r) Oil-filled, coil-
over shocks

WHEELS:

Type (f/r) One-piece plastic
Dimensions (DxW) (f/r) 2.2x2
inches

TIRES:

Front/Rear Pin-spikes

POWER:

Engine CZ-R(K) 12

OPTIONS AS TESTED:

Futaba radio; RCD Shredder micro receiver; Futaba FP 148 servos
Sanyo 1000mAh 6V receiver battery.

COMMENTS:

Is the Outlaw Rampage any fun? Yeah, it is! Although its handling could be better, hearing the sound of the CZ-R(K) screaming down the track makes me feel as if I'm watching a full-size truck. The CZ-R(K) engine has more than enough power for a truck of this size, and the included D-cell battery holder and fuel bulb work very well. The gas tank has a built-in primer pump and a recoil pull-starter that make starting the engine a cinch.

THE KIT

First, I checked out the layout of the chassis and suspension. The aluminum pan-type chassis' front end is similar to that found on the electric-powered Ultima Outlaw. It has long, black, composite shocks, a tall, aluminum, front shock tower, long A-arms, adjustable upper links and servo-saver steering bellcranks.

Just behind the steering servo, things get interesting. You mount the supplied O.S.* CZ-R(K) engine in the center of the chassis, just in front of the gearbox assembly. A forward-facing centrifugal clutch transfers the power



rampage

from the engine to the transmission. This clutch drives the main gear and the shaft that runs rearward alongside the engine. A slipper-clutch assembly at the end of the shaft connects the drive belts to the transmission's gear diff. The narrow gearbox allows the use of long A-arms on the rear suspension, and they make the

ride more stable. The kit includes pin-spike tires and neon-yellow wheels with dirt guards for all corners of the truck.

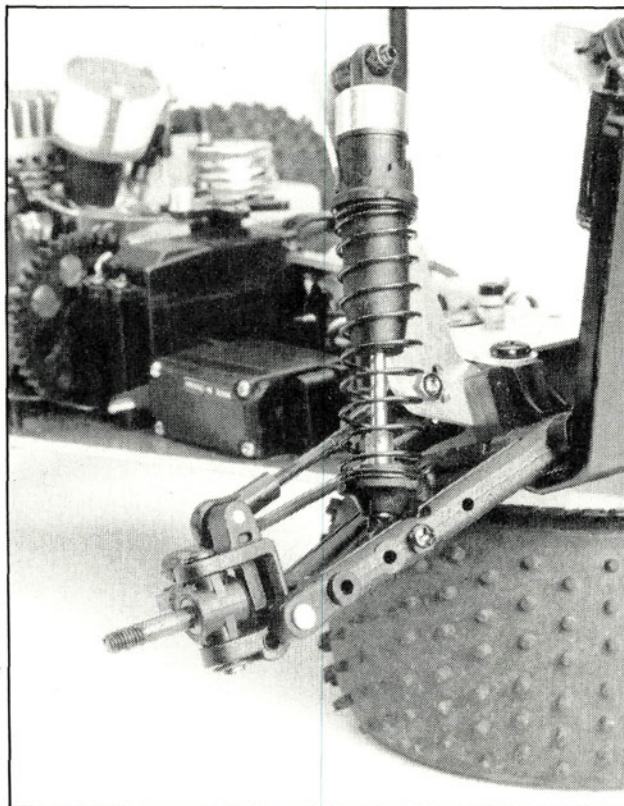
CONSTRUCTION

When I was familiar with the Rampage's general layout, I set up my work space. (This entailed tuning my stereo and finding the ice trays that I use to hold the hardware and the small parts!) I had all the necessary tools on hand—plus a Futaba* Magnum Jr. radio with two servos, an RCD* Shredder micro receiver and a battery pack.

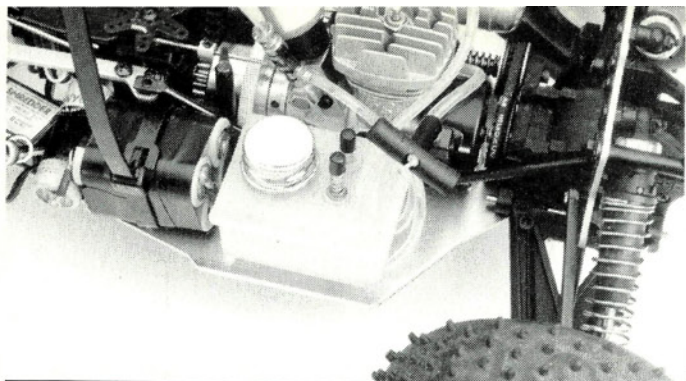
In most electric cars, the drive battery is used to power the radio system, but in gas cars, you need to add a receiver pack for this. I made one with five 1000mAh Sanyo* cells (KR-1000AE). The extra capacity that these cells provide ensures that the radio will operate more reliably. The instruction manual covers the construction steps very well (much better than I could!), so follow it carefully. There were some things that I found interesting, and I want to give you a few helpful tips.

To limit the A-arms' travel and provide a "cushioned" stop, you put small pieces of fuel tubing on the front shock shafts. Initially, I thought that this would hamper suspension travel, but it has been helpful because it prevents the chas-

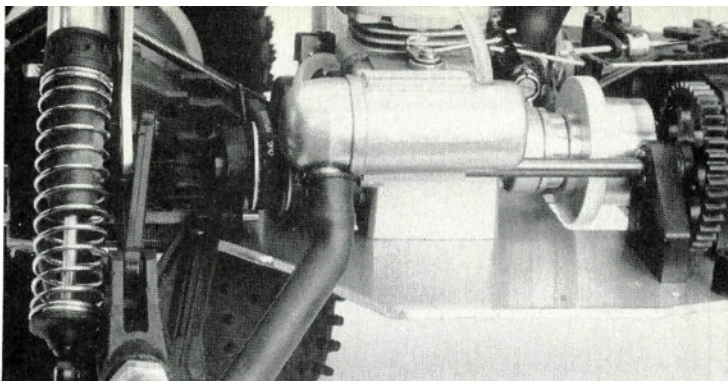
"the CZ-R(K) engine has more than enough power for a truck of this size..."



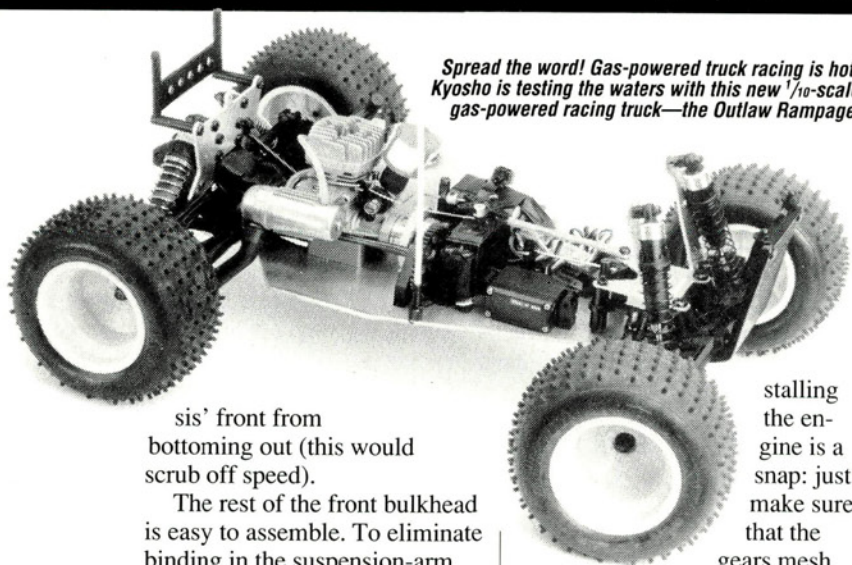
Based on Kyosho's Ultima Outlaw electric racing truck, the Rampage has a race-proven suspension and long front shocks to provide the extra damping that racing trucks need.



An O.S. CZ-R(K) .12ci pull-start engine is included with the Rampage. Its large fuel tank allows for runs as long as 20 minutes!



An aluminum chassis is the Rampage's "backbone." Power is transferred from the spur gear to the transmission through the drive shaft. When the engine reaches sufficient rpm, the centrifugal clutch allows the power to be transferred to the tranny.



Spread the word! Gas-powered truck racing is hot! Kyosho is testing the waters with this new 1/10-scale gas-powered racing truck—the Outlaw Rampage.

sis' front from bottoming out (this would scrub off speed).

The rest of the front bulkhead is easy to assemble. To eliminate binding in the suspension-arm travel, I cleaned out the holes in the arms by running a drill bit of the same diameter as the hinge pins through them. I also removed the leftover flashing from the arms.

Before I attached the front bulkhead to the chassis, I applied the new Litespeed* Tuff-Stuff adhesive plastic film to the chassis' underside. This prevents it from being scratched and reduces friction when the truck bottoms out. I followed the product's directions carefully, and I ended up with a very slick, well-protected chassis. I was really disappointed when I discovered that glow fuel causes Tuff-Stuff to lose its adhesive qualities. (This material is still great for electric vehicles!)

When you reach the gearbox installation, you'll be happy to see that the differential comes assembled. (It's a simple bevel-gear diff, so I'm not sure why Kyosho chose to supply it assembled. I can't complain, though; it works just fine!) In-

stalling the engine is a snap: just make sure that the gears mesh properly. In the

stock setup, you have to bend the fuel line sharply to meet the needle valve. To avoid having to do this, I loosened the needle valve's locking nuts and turned the valve almost 180 degrees. To

low the suggested servo-arm lengths to the millimeter. To ensure that my radio gear isn't accidentally turned off while my car is running, I omit the onboard radio power switch, and I plug the battery directly into the receiver. Make sure that your batteries are secured tightly to the chassis; using a little servo tape in addition to the tie-strap should keep them in place during a collision.

BODY

The excellent, kit-supplied decals made it easy to finish the body. Although I followed the two-tone paint scheme that's displayed on the box, I added a little more color. Pactra's* Racing Finish fluorescent-yellow and competition-orange paints matched the decals perfectly. I backed the colors with white



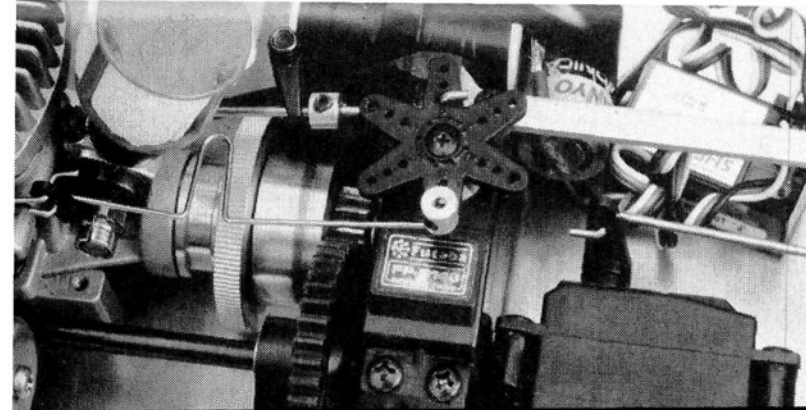
enable the throttle arm to move to the full-open position more freely, I trimmed the exhaust-manifold gasket.

The manual covers the radio-gear installation very thoroughly. If you only want to do this job once, just be sure to fol-

paint to protect the finish, as the underside of this body can get fairly messy.

The kit includes side dams that you can attach to the body to protect the chassis, but I didn't install them because I wanted more cooling air to

rampage



A second servo is needed for throttle control. The linkage is hooked directly to the engine's carburetor.

reach the engine. I might add them later, though, because the dirt that's thrown up by the front tires accumulates in the chassis.

FUEL FOR THOUGHT

With its body complete, the Outlaw Rampage was ready to be fired up for the first time. To start the engine, you need glow

the glow plug and its black lead to the engine head. Hold the car and give the starter a firm, quick tug. It may take a few tries to fire-up the engine. If it doesn't start, refer to the manual's troubleshooting diagram.

For my first three tanks of fuel, I ran the engine extremely rich, which caused a lot of

"...never run gas engines indoors!"

fuel and a glow-plug battery. The kit includes a holder for four D-cells, which will provide enough power to start the engine for a long time. I recommend that you use a high-quality, 10-percent to 25-percent-nitro fuel (I use a 10-percent nitro). Ask the people at your hobby shop which brand they recommend. Another nice accessory that's included in the kit is a fuel bulb. It enables you to fill the tank quickly—without a lot of mess.

Carefully, read the starting sequence that's outlined in the manual. When you're familiar with it, set the car up outside (*never* run gas engines indoors!), and get ready for action. Check that your batteries are charged, and make sure that your radio is working properly. Fill the tank with fuel and prime the engine by pumping the built-in primer pump twice. (Each time you press the plunger on the tank, a little fuel is delivered to the engine.) Connect the glow battery's red lead to the top of

smoke, sputtering acceleration and low power output. It also provided the piston and cylinder with plenty of lubrication while they were being broken-in.

The engine was soon broken-in, and I leaned-out the fuel to see what this baby could do. I adjusted the needle valve two clicks at a time and, soon, the engine was producing a 2-stroke whine at full throttle, but it sputtered and stalled at idle. Although I had set the idle speed according to the instructions, I had to adjust the low-end mixture by slightly turning the recessed screw that's in the center of the throttle arm. After about half a turn inward, the low end power really kicked in. When I was satisfied with the engine's behavior, it was time to head to the track.

TRACKING THE TRUCK

If you assemble the upper links according to the instructions, the Rampage's front end will be set

(Continued on page 108)

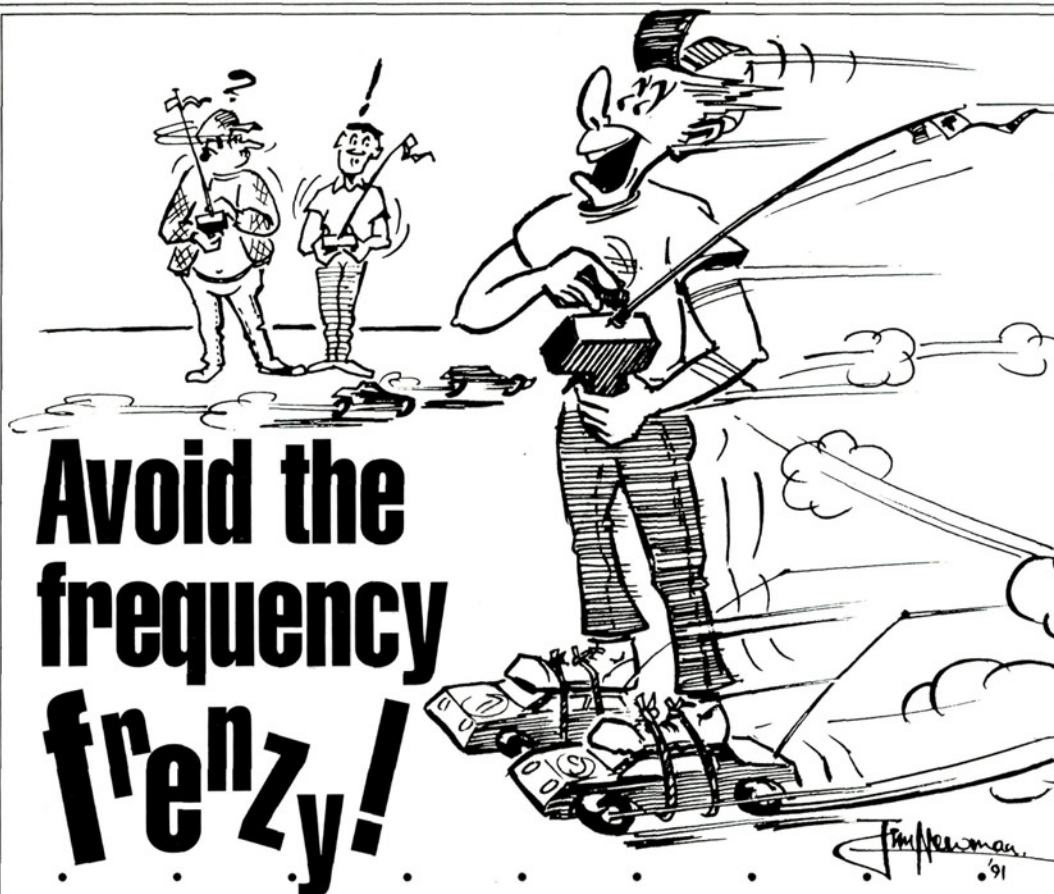
assault team!

Newcomers to gas-powered R/C might be interested to know that gas-powered cars predated the electrics, and the Outlaw Rampage isn't Kyosho's first gas-powered, 1/10-scale track burner. Way back in 1986 (waaay back!), Kyosho converted one of its electric buggies to gas power, and the result was the Assault. Based loosely on the Cox Scorpion, the Assault was essentially an electric car with an O.S. .12 engine "tacked" onto the back of its chassis. By today's standards, its chassis layout would look strange, but keep in mind that Kyosho was experimenting and, at the time, there weren't many gas-powered, off-road cars available to study.

The Assault had some innovative touches, though, e.g., a built-in ignition-battery circuit. It simplified starting by eliminating the need for alligator clips and additional wiring; you simply loaded a standard D-cell into the spring-loaded holder that was attached to the car's front, pulled the "zip-strip" (a detached pull-starter) and the car started.

The Assault was rugged and fun to drive. Its only problems were caused by its odd engine placement. It was mounted so far back on the chassis that there was very little weight up front, and this caused the car to do wheelies. Although dirt is a problem for the engines on most gas-powered off-road cars, on the Assault, the engine's position made dirt even more of a problem. Things sure have come a long way!





Avoid the frequency frenzy!

You should all be properly informed about the radio frequencies we use in our hobby. It's so important that we've decided to devote this space to a list of all the frequencies that are legal for R/C cars, boats and planes. We've also included the newest, odd-numbered channels, which have been legal since January 1, 1991. Remember that some radio systems will have difficulty decoding signals because of the odd-numbered, 75MHz frequencies; their tolerances aren't tight enough to work correctly on these close channels.

27MHZ AIRCRAFT, CARS AND BOATS

Frequency	Flag Color (USA)
26.995	Brown
27.045	Red
27.095	Orange
27.145	Yellow
27.195	Green
27.255	Blue

50 AND 53MHZ AIRCRAFT, CARS AND BOATS

FCC amateur licence required

Frequency	Channel No.
50.800	RC00
50.820	RC01
50.840	RC02
50.860	RC03
50.880	RC04
50.900	RC05
50.920	RC06
50.940	RC07
50.960	RC08
50.980	RC09

Frequency	Flag Color (USA)
53.100	Black-Brown
53.200	Black-Red
53.300	Black-Orange
53.400	Black-Yellow
53.500	Black-Green
53.600	Black-Blue
53.700	Black-Violet
53.800	Black-Gray

1 9 9 1 L E G A L F R E Q U E N C I E S

72MHZ—AIRCRAFT ONLY

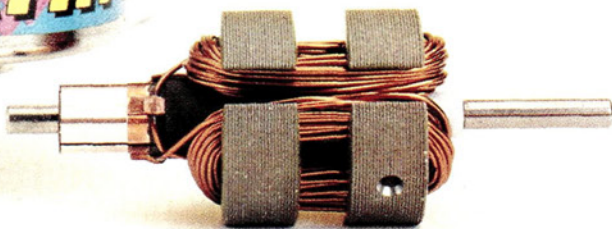
Frequency	Channel No.	Frequency	Channel No.	Frequency	Channel No.
72.010	11	72.350	28	72.690	45
72.030	12	72.370	29	72.710	46
72.050	13	72.390	30	72.730	47
72.070	14	72.410	31	72.750	48
72.090	15	72.430	32	72.770	49
72.110	16	72.450	33	72.790	50
72.130	17	72.470	34	72.810	51
72.150	18	72.490	35	72.830	52
72.170	19	72.510	36	72.850	53
72.190	20	72.530	37	72.870	54
72.210	21	72.550	38	72.890	55
72.230	22	72.570	39	72.910	56
72.250	23	72.590	40	72.930	57
72.270	24	72.610	41	72.950	58
72.290	25	72.630	42	72.970	59
72.310	26	72.650	43	72.990	60
72.330	27	72.670	44		

75MHZ—CAR AND BOATS

Frequency	Channel No.	Frequency	Channel No.
75.410	61	75.750	78
75.430	62	75.770	79
75.450	63	75.790	80
75.470	64	75.810	81
75.490	65	75.830	82
75.510	66	75.850	83
75.530	67	75.870	84
75.550	68	75.890	85
75.570	69	75.910	86
75.590	70	75.930	87
75.610	71	75.950	88
75.630	72	75.970	89
75.650	73	75.990	90
75.670	74		
75.690	75		
75.710	76		
75.730	77		



one- armature bandit



TRINITY'S* NEW Slot Machine was the first motor to be approved under the 1991 ROAR rules requiring that stock-class motors have locking devices on their commutators to restrict timing to a maximum of 24 degrees. The fixed commutator prevents racers from tampering with the motor's timing—a too-common practice at large-scale R/C racing events.

That the Slot Machine was the first motor of this type to be approved isn't its mark of distinction; it's the motor's patented armature design, among other things, that may separate the Slot Machine from others in its class.

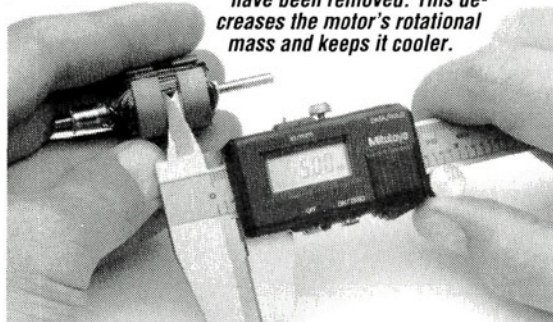
The Slot Machine has a redesigned commutator that includes the locking device, which extends from the commutator down around the three segments of the armature. This prevents the commutator from being twisted in relation to the armature to increase timing.

The magnets also affect the motor's timing. Previously, there was no way to know if the magnets had been positioned correctly in the motor can. The more user-friendly Slot Machine has guides at the zero timing mark to ensure that the magnets are properly placed.

A tab on the endbell fits tightly into a slot on the can. Previously, stock-motor endbells were held in place with two tabs (one on each side of the can) that were bent into slots on the endbell. This method held the endbell to the can, but it could still be twisted slightly to obtain a small timing increase. The tab on the Slot Machine's endbell fits snugly into the slot in the can, so the endbell can't be twisted at all without noticeably damaging it.

According to Trinity, the Slot Machine's redesigned armature provides much better performance *despite* the reduction in timing. The standard armatures used in R/C motors are a series of laminations stacked to form what's referred to as a "three-slot armature." The Slot Machine's

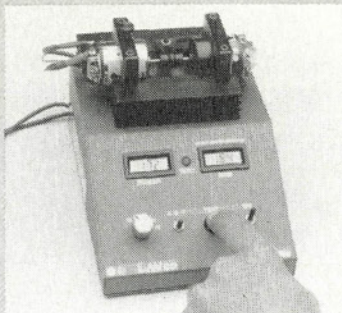
The Slot Machine's armature differs from other designs: pieces of the armature plates have been removed. This decreases the motor's rotational mass and keeps it cooler.



TRINITY Slot

mac

armature is assembled similarly, but a 5mm-wide section of the lamination has been removed from the armature's center. This reportedly reduces the motor's running resistance and provides additional cooling for it.



HITTING THE JACKPOT

We tested the Slot Machine in the LAVco* Pro Dyno and afterwards on the track. At that time, no other ROAR 1991 stock motors were available for comparison, so we found a couple with higher timing and compared them with the Slot Machine.

The initial tests took place on the bench with the LAVco Pro Dyno. We ran five Slot Machines to test the consistency of their performance, and we found that the tamper-proofing seemed to make the motors more consistent! The motors didn't differ by more than 300rpm at any load setting. Previous Trinity and other stock motors had varied by as much as a couple of thousand rpm. Obviously, five motors isn't a large sample, but their performances must show what we can expect from this line.

The Slot Machine was tested against two proven hot performers that are frequently used in stock-class racing: the Reedy* Ultra Series stock with 37 degrees of timing; and the B&R* Pro Magnum with a reported 44 degrees of timing.

The testing revealed that the Slot Machine was the most powerful and efficient motor at lower amp settings. It had a Dyno power reading of close to 170; the Reedy and the B&R had readings of 130 to 140. (This is a good indication of straightaway power and speed.) The results obtained at higher settings were more comparable and, at the 25A and 30A load settings, the "mega-timing" motors outperformed the Slot Machine. (This indicates that, given the same gear ratio, they would pull more strongly out of turns.)

The Slot Machines were track-tested in both oval and off-road cars. Early on, we dropped a tooth or two on the pinion gear to keep the Slot Machine pulling strongly through the turns. The Dyno readings proved to be true: the Slot Machine runs best when it has been given a chance to rev-up. Overgearing just softens the throttle response com-

ing out of the turns, but there's no appreciable difference in top speed. In head-on competition, the Slot Machine has made believers out of the "over 40 degrees club," because it motored right past some of those big guns.

It's too soon to determine how the Slot Machine will do against other ROAR-legal '91 stock motors, but the results of our tests indicate that this motor's reduced timing won't reduce performance. In fact, most of our tests proved this motor is faster!

**Here are the addresses of the companies mentioned in this article:*

Trinity, 1901 E. Linden Ave., Linden, NJ 07036.

LAVco, 3150 E. La Palma, Unit B, Anaheim, CA 92806.

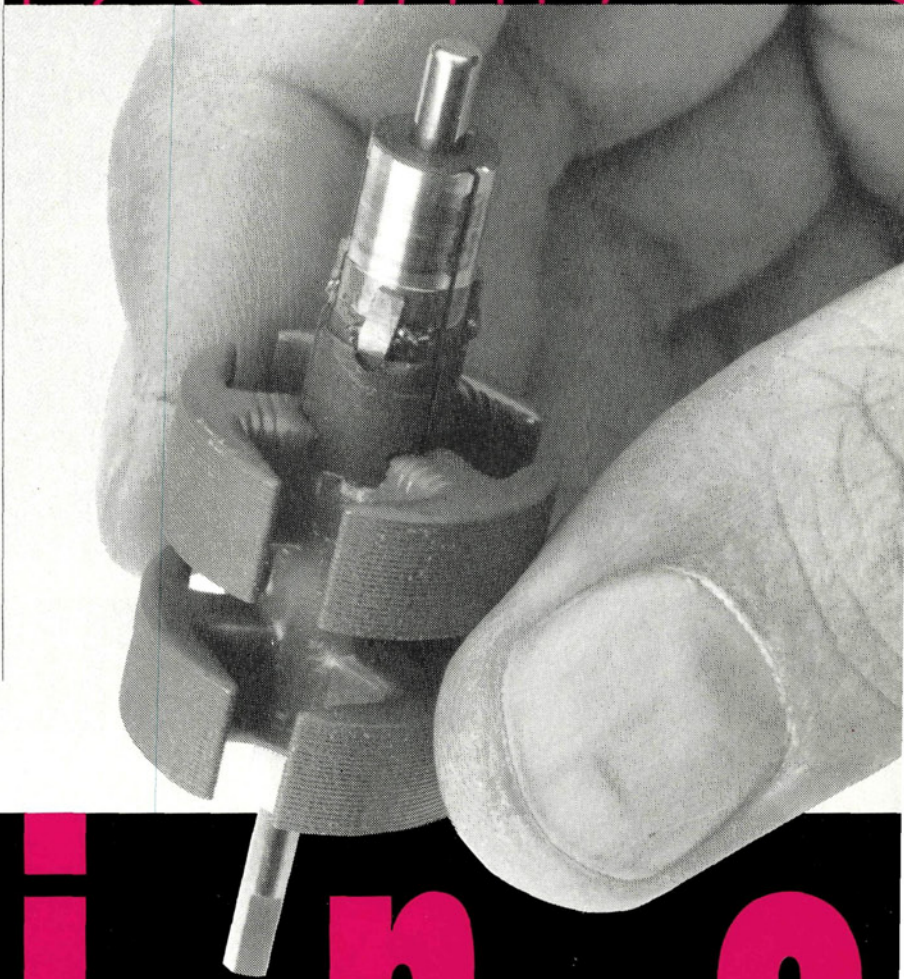
Reedy; distributed by Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

B&R Motorworks, 28000 Tothill Dr., Saugus, CA 91350. ■

■ **Left: The Slot Machine** was tested against other stock-class motors on the LAVco Pro Dyno.

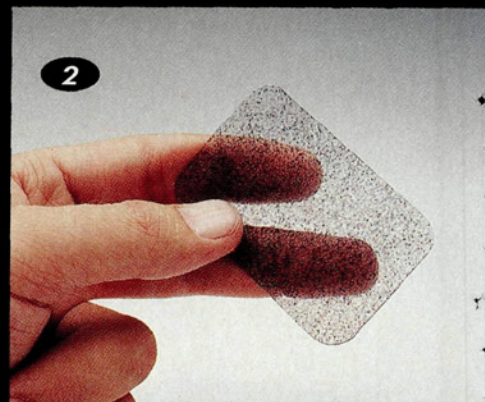
■ **Below: What's the secret of the Slot Machine's success?** Its radical new armature design makes it a more efficient, higher-revving racing motor.

"The testing revealed that the Slot Machine was the most powerful and efficient motor at lower amp settings."



h i n e

by STEVE POND



Although you can achieve startling effects using an airbrush, you can also produce concours-winning paint jobs by using spray paint. To get started, you need Lexan-compatible spray paint, nail-polish remover and isopropyl alcohol. If you plan to use an airbrush, you'll also need an air compressor and bottled paint.

This scrap piece of Lexan shows how much paint you should use for the first coat.

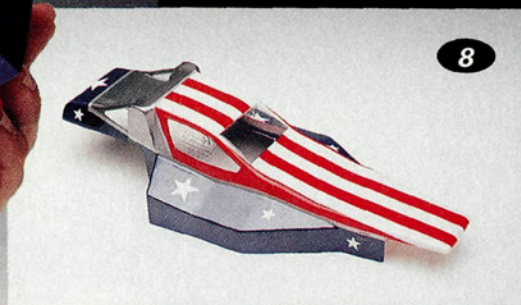
Painting Lexan Bodies

by
RICHARD MUISE

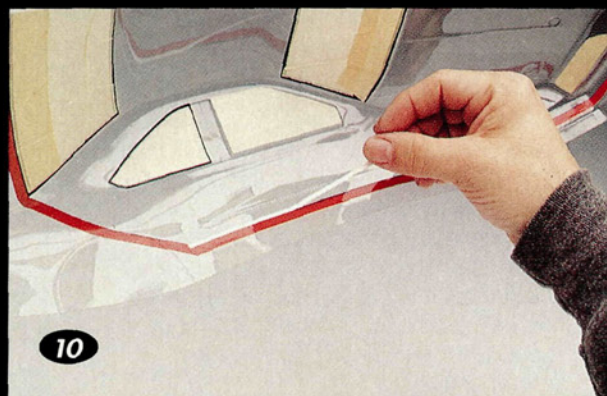
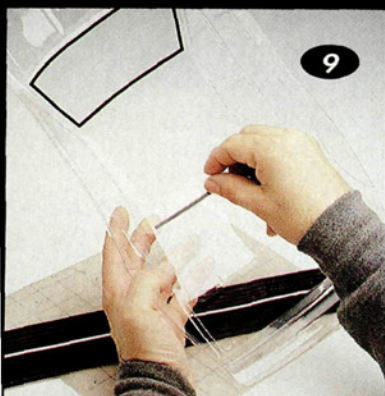
Layin' o

ALTHOUGH LEXAN bodies have been around for the last six or seven years, many people still have trouble painting them so they look as good as they should. Overspray or runs have ruined many a first attempt. Car Action has asked Motion Graphics'* Richard Muise (one of the U.S.'s top body painters) to show you how to create a truly awesome body. With Richard's tricks

I checked the masking tape and burnished it wherever necessary before I applied the white paint. It's good to do this after each coat of paint has dried.



When the white-striped area had dried, I added the finishing touch to the Viper's body by painting the silver section behind the roof.



To simulate the weather stripping that seals the windows on full-size NASCAR racers, I outlined the windows by applying thin black pinstriping to the T-Bird's interior. Then I masked the rest of the area with standard masking tape.

I used red and white pinstriping tape to separate the colors on the body. You can leave the pinstriping on, or remove it and paint these areas later.

When the paint on the body had dried, I painted the headlights silver. Although I used an airbrush, you could easily produce this scheme by using aerosol-can spray paint.



Before you paint the body, wipe its interior with a lint-free cloth or a tack-rag to pick up dirt and dust.



Whenever possible, spray on the dark colors first, e.g., the blue area on the Viper body. Applying light coats helps to seal the masking tape to the body.



When the blue paint had dried, I removed the masking that covered the red-striped area and sprayed on the red paint.

own the lacquer

and a little practice, you'll be able to paint and detail Lexan bodies like a pro.

This is the third article in a four-part series—check out “Cut & Trim Lexan” (July '91) and “Body Masking” (August '91). The series will conclude next month with “Detailing.”

Painting Lexan R/C car bodies can be a chore for first-time builders. The most commonly used painting method is aerosol spray painting. Although most of the bodies I paint for Motion Graphics are airbrushed, you don't have to do this to produce a nice paint job.

The question that I'm asked most frequently is, “What kind of paint do you use?” Unless you're an accomplished painter, I recommend that you use

paints specifically made for Lexan/polycarbonate R/C car bodies, e.g., Coverite's* Body Shop or Pactra's* Racing Finish. (Note: test all paints and solvents on a scrap piece of Lexan before you apply them to a body.) Rather than repeat the directions found on paint-can labels, I'll just remind you: read all directions and precautions carefully; they're there for a reason.

When you've applied and burnished all the body masking (see “Body Masking,” in the August '91 issue) you're ready to paint.

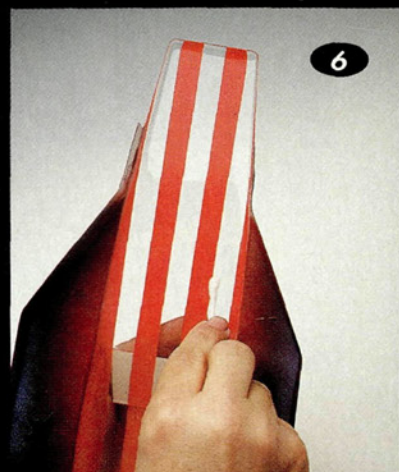
PAINTING PROBLEMS

People encounter three major difficulties when they paint Lexan bodies:

● **The paint is sprayed on too quickly and too heavily.** This causes several prob-

lems. The paint runs and “sags,” and these blemishes are particularly visible in metallic, neon or candy-color paints. Worse, a heavy coat of paint takes a long time to dry, and it can pool and run under the masking. If you apply the paint in many light “mist” coats and wait a few minutes between each coat, you'll avoid this problem. The light coats will dry very quickly, and the paint will seal the masking's edges instead of running under them. To apply a mist coat, make only a few quick passes with the paint.

● **Successive coats of paint bleed through the first coats.** As a rule, you should apply dark colors first and then the lighter colors, but this isn't always possible. I've had



When the red paint had dried, I uncovered the sections that were to be painted white. Clean the adhesive residue left by the masking tape off the clear Lexan using a cotton swab and my cleaning solution.

problems with white, yellow, red and some metallic colors. The solution is to get the best possible coverage with the first color and, when it has dried, back it

continued on page 63



It's very important to apply the paint in light coats, or it might run under the pinstriping tape and spoil an otherwise perfect paint job.



To simulate the window tinting, I took the masking off the windshield and applied a light coat of black and blue paint to its top edge.



The completed Bill Elliott T-Bird body is ready for some finishing touches. Don't miss the article on detailing in the next issue of Car Action!

with a coat of white or silver paint (through which the darker colors won't be able to show) before you apply the next color.

• **Dust and dirt get in the paint.** Before you start to spray the body, wipe it with a lint-free cloth or a tack-rag. Available at most paint-supply stores, tack-rags are chemically treated to pick up dust and dirt.

When you've finished painting, clean any overspray off the body's exterior with a mixture of two parts nail-polish remover and one part alcohol. This mixture works well, and it won't damage the body. To avoid overspraying, mask the body's exterior before you start to paint. Gently apply (so that it's easy to remove later) 1-inch-wide masking tape to the exterior's lower perimeter. Remove the tape when the body has dried completely.

VIVACIOUS VIPER

I realize that many of you don't have an airbrush. With this in mind, I spray-painted the Associated* Viper body to show you that an airbrush isn't essential to create a killer paint job!

After I had I laid out the Viper body's design and applied the masking, I was ready to paint. First, I painted the areas with the stars blue. I sprayed on the first coat as lightly as possible because this helps to seal the masking and prevent the paint from pooling and running under the tape. After the first coat had dried, I continued to add light, mist coats until

I had achieved the desired coverage. When the blue area had dried completely, I peeled off the masking that covered the red-striped areas, and sprayed them red—again—using light coats! (Remember, wherever possible, paint all the dark colors first so that they won't bleed through the lighter ones.) When I was satisfied with the coverage of the red paint, I let it dry and then peeled off the masking that covered the white-striped areas. After a thorough application of white paint,

"There's no black magic involved in painting show-stopping R/C bodies."

I sprayed the final color—silver—onto the rear of the Viper's roof. I didn't need to use an airbrush to make this body look good. All it took was some careful planning and masking and a few cans of spray paint.

AIR TIME!

The use of an airbrush will add a new dimension to your painting. You'll have much more control of the paint and the spray pattern, and you'll be able to achieve more startling results, particularly with shading and fading.

There are many different brands and types of airbrushes, but the single-action and double-action types are the most common. With one press of the button, single-action airbrushes mix paint with air. On double-action airbrushes, you push the button down to get air and then pull it back to mix paint with the air. The further back you pull, the more paint you get. I recommend double-action air-brushes because they're more versatile and will help you create the best special effects.

For an air supply, you can use either canned air or a small compressor. Which-ever you choose, it should be able to maintain a pressure of 20psi to 30psi for the best results.

You'll also need several interchangeable bottles so that you don't have to clean a bottle every time you change colors. Many airbrush manufacturers offer caps that fit the original paint

bottles, so you can just attach the airbrush to the container and start spraying.

Again, unless you're an experienced painter, use only paints that are compatible with Lexan. Most of the bottled paints made for Lexan should be thinned before you spray them. I use a mixture of one part paint and one part acrylic-lacquer thinner. Bear in mind that a paint's density may depend on its color (e.g., black paint is more viscous than white paint). Paint that has been properly thinned will drip

from a stirring stick at the same rate as water. (Caution: remember that paints and solvents are flammable, and they should always be used in a well-ventilated area. Avoid prolonged exposure to the vapors.) If the spray through your airbrush creates "cobwebs," then the paint is too thick. If the paint is too thin, it will be difficult to cover the surface properly.

WHO WAS THAT MASKED MAN?

I painted the Associated Bill Elliott T-Bird body with an airbrush, but most of the creativity is actually in the masking. Generally, I apply the masking first, but on NASCAR racers, I outline the windows with black pinstriping on the body's interior before masking. This represents the weather stripping that's used on the full-size cars' windshields, rear windows and side windows. The driver's window doesn't have glass, so this outline isn't necessary there. (You can also simulate the grill openings with black pinstriping.) I masked the headlight covers and painted them with silver later.

I drew the striping on the body's exterior with a marking pen, and then—to separate the white and blue areas—I applied the 1/4-inch red pinstriping. Next, I applied 1/8-inch white pinstriping along the top edge of the red stripe, and then I masked everything below the white pinstripe with masking tape.

I sprayed the

(Continued on page 123)

TROUBLESHOOTING

by STEVE POND

Illustrations by JIM NEWMAN

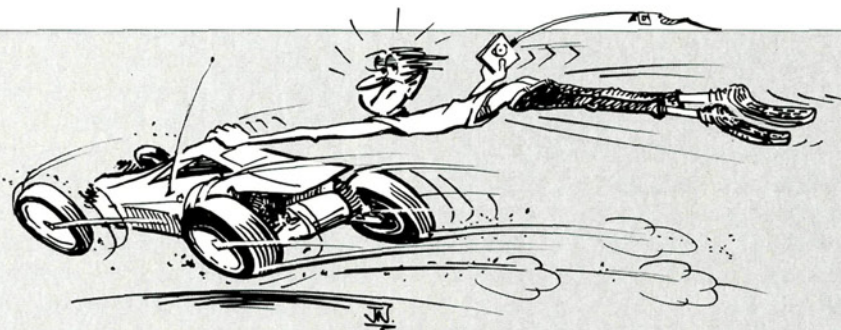


SUFFERING FROM SCREWY STEERING

I own a JR-XT that I race on a dirt oval. I'm having problems with my Futaba S148 servo. I have the servo mounted in the suggested location. On the truck, I have a JRX-Pro ball-bearing bellcrank and a Kimbrough servo-saver. After a while, the final gear on the servo wears, and this causes a lot of slop in the steering. I replaced the servo once, and the same thing happened to it. What should I do? Would something like the Winning Edge rack-and-pinion steering solve my problems?

Ross Clyborne
Canoga Park, CA

The servo is probably causing your steering problem. The Futaba S148 servo is standard with most radio kits, and it's suitable for many applications, but I don't recommend that you use it to race on a dirt oval with a modified truck. The Futaba 9101 and 9301 servos are better for this. They have more torque and a stronger gear train that should last longer than the one in the S148. If you're on a budget and you'd like to stick with the S148 servo, you can replace the gears inside the servo, rather than buying an entirely new servo.



ROARING TO GO!

I own a JRX-Pro with a Twister ROAR stock motor, a Tekin ESC 310 and a Futaba Magnum Sport. When I floor it, it sometimes sticks at full throttle, but I can steer it. I have four motor capacitors, and the receiver is on the chassis. For more power, the ESC's BEC bypass wires are connected to the receiver and the servo. I know that water isn't causing the problem.

Travis Pierce
Battle Ground, WA

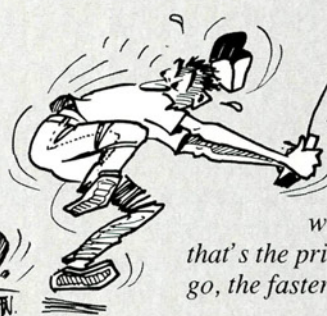
The problem is probably the result of your BEC bypass wires being connected. These wires should only be connected when you use the speed controller in a car that's powered by four cells. A typical radio receiver is designed to operate with 5 volts, which are produced by a 4-cell pack. When you use a 6- or a 7-cell pack, the higher voltage is regulated by the BEC. Connecting the bypass wires when you use a 6- or 7-cell pack will supply the receiver with up to 10 volts!

CONTROLLER COMBUSTION!

My friend and I have RC10 CE's and Futaba MC 112B ESC's. My friend's speed controller blew up. Is there a special way to mount it to prevent this? And what can I do to get longer run times?

David Kniolek
Austin, TX

It's unusual for a speed controller to just "blow up." Very few have manu-



facturing defects, and a damaged speed controller is usually the result of its having been connected backwards, or mishandled in some other way. The best place to mount a speed controller in the RC10 CE is on the chassis on either side of the battery. The MC112B is one of the larger speed controllers, and it may not fit alongside the battery. This makes the shock tower the next best choice. The vertical position of the speed controller on the shock tower isn't ideal for cooling, but a simple vent cut in the roof of the car's body should keep down the temperature. Longer run times can be obtained just by changing to a smaller pinion gear. The car will be a little slower, but that's the price you pay; the faster you go, the faster the battery goes!

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.

THE MONEY PIT

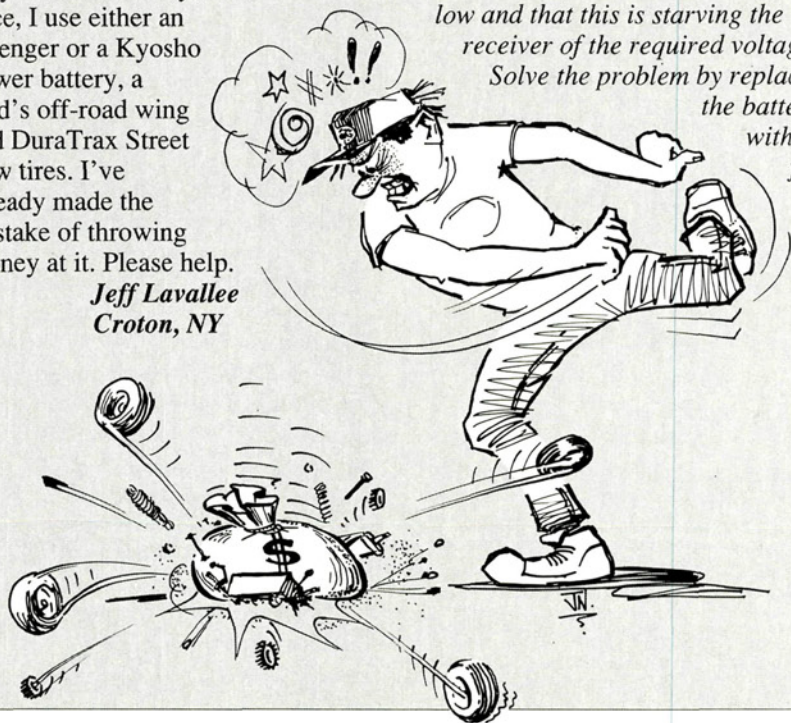
I own a Turbo Ultima II, and I've got problems. When it accelerates, the rear end slides around, especially when I try to turn it. Also, when the car bumps into something, it shudders. I can't get it to run for more than 3 minutes; sometimes, it stops dead, and then, strangely, the steering controls the throttle. Steering right on the transmitter makes the car go forward, and if I try to go left, the brakes are applied. (By the way, the throttle and the brakes are proportionate when this happens.) When I try to accelerate quickly, the car makes a grinding noise, and it takes a while to get up to speed. I thought that the diff needed adjusting, but I've often tried that. I've also taken the diff apart many times, but that hasn't helped either. I use a Trinity Triad 11-turn motor, a Novak 410 M1c speed controller and a Futaba Attack-R radio. I run it on my street (a dead end), which is pretty slippery. If it makes any difference, I use either an Avenger or a Kyosho power battery, a Bud's off-road wing and DuraTrax Street Paw tires. I've already made the mistake of throwing money at it. Please help.

Jeff Lavallee
Croton, NY

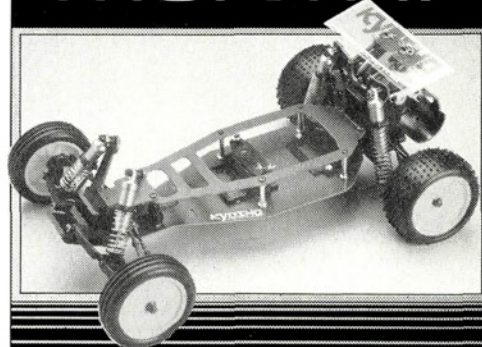
Your run-time problem is undoubtedly caused by the 11-turn Triad motor. I've often tried to explain to readers that this type of motor, which has relatively few turns, is designed exclusively for drag racing or high-speed oval racing; not for running up and down the street. It's like putting a top-fuel, 5,000hp racing engine in a car your grandparents use to go for groceries once a week! No matter what you do, it will get crummy gas mileage and give you tremendous maintenance problems. Though suitable for drag racing, the Triad motor is wreaking havoc on your battery and your car. Too much power going through the drive train damages the gears, and that's what's causing the grinding noise. Check the outer gears and those in the differential to see if any teeth have been bent, or completely stripped.

The only thing I can think of that might be causing your radio problems is that you run the battery too low and that this is starving the receiver of the required voltage.

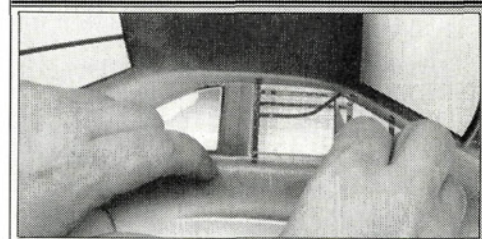
Solve the problem by replacing the battery with a fresh one.



COMING NEXT MONTH!



KYOSHO TRIUMPH



FEATURES

Body Detailing
Home-Built Pocket Racer
Project Bulldozerhead
Shinwa Operate
Tranny Roundup

TRACK REPORTS

Losi Junior T
Pirate M-1
Corally SP-12

COLUMNS

NEW: Nitro News
Scoping Out
Troubleshooting

PULLIN' FOR POWER!

I have a Kyosho Rampage that has an O.S. .12 engine, and I'm having trouble with the engine's pull-starter. I'm a good mechanic, and I can fix it, but the end of the spring inside the starter keeps breaking. I have to take it apart and bend it back, and I'm sick of doing this. Now Panda offers gas-powered cars. Are they better?; and could I use their equipment to power my Rampage?

I'm also having trouble with the engine itself. At full throttle on a straightaway, it stalls in about 3 seconds; then it's hard to start unless I prime it. Help me solve my problems!

Brian Schutzler
Camano Island, WA

The O.S. engine that's included in the kit works very well, and I recommend that you stick with it. I haven't had a problem with the pull-starter on my new gas-powered Outlaw Rampage. Perhaps you should replace the starter's recoil spring. Every time the old spring breaks and you bend the end of it to hold it in place, you shorten the spring. This increases stress on the spring (this could break it), and it increases your chances of snapping the starter's cord.

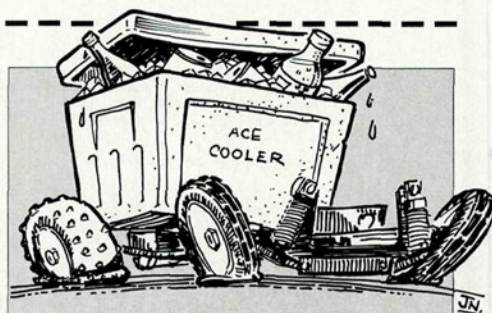
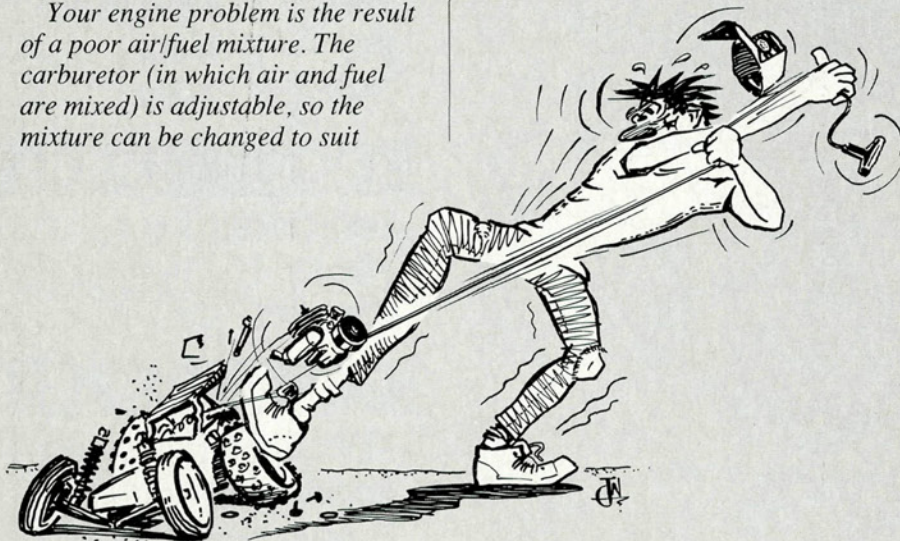
Your engine problem is the result of a poor air/fuel mixture. The carburetor (in which air and fuel are mixed) is adjustable, so the mixture can be changed to suit

changing weather conditions. Your car's engine is the older version of the CZ-R, and it has only a high-speed mixture adjustment. For reliable running, this mixture must be adjusted properly. Your engine may be running too lean; it's difficult to tell without hearing it run.

To adjust the mixture, start by turning the mixture needle clockwise until it's closed; then turn it counterclockwise three times. This is a good starting point, but it will have to be adjusted further.

Did you oil the air filter according to the manufacturer's instructions? If you didn't, small pieces of dirt can pass through it and wear the engine's piston and sleeve. This will have a drastic effect on the engine's compression and cause problems similar to those you've described.

If adjusting your engine doesn't work, recruit the help of an accomplished airplane flier. To tune an engine for proper running, you must evaluate its reactions as you make slight changes and make your adjustments accordingly. Fliers who have experience with gas-powered engines may be able to help you.



COOLER OPTIONS

I own a Tamiya Lunch Box, a Tamiya Frog, an Associated RC10 and a JRX-Pro. The JRX-Pro is my best car; no one can catch it, or even come close. But I have two questions about it. I've read all the articles on it, and I wonder if there's any way to attach a cooler to it. Also, lately, I've noticed a slight drop in speed. I use Futaba electronics, a Novak T-4 speed controller, matched Sanyo cells and a mega 18x2 off-road motor. I bought a new battery and got the same response. I can still outrun everybody, but how can I bring my car's speed back up? The car is only about 2 1/2 months old.

Kevin Lanier
Cypress, TX

Make a trailer and a trailer hitch for the cooler, but limit the number of soda cans and ice cubes to prevent it from slowing your car down too much—just kidding! Litespeed produces a heat sink that can be used to replace the stock motor-mounting plate on Team Losi cars and trucks. The new Litespeed motor plate has an attached finned heat sink that draws heat from the motor.

As for the deterioration in performance, it can be attributed to poorly maintained batteries or a mishandled motor. If, over two months, you haven't cleaned and maintained the motor properly, the condition of the commutator and brushes will cause a drastic deterioration of the motor's performance. If you know someone who can rebuild the motor, think about having it done. Several companies offer this service through our magazine.

B L U

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by JOHN HUBER



E A G L

IF YOU READ Chris Chianelli's review of the Traxxas* Eagle in the December '90 issue, you'll know that I was very impressed with this new racing truck—so impressed that I bought one. I loved the way it handled, but I could see some areas that needed improvement; and then I heard about the Traxxas *Blue* Eagle.

The Blue Eagle's design is based on that of the Eagle, but the Blue has the refinements that were used by Tom Owens to win the '90 NORRCA Off-Road Nats in Dallas, TX. Up-

grades include a bellcrank-type steering system, a low-friction 48-pitch transmission, blue-anodized shocks

and motor plate, and an improved transmission. Though the blue anodizing doesn't do much for the truck's handling, the other refinements sure do.

**the
eagle
has
landed!**



PHOTOS BY JOHN HUBER



"Traxxas doesn't only tell you what to adjust, but it also explains how each adjustment will affect handling."

.....

TRANNNY TROUBLE

After I had raced with the original transmission for some time, several problems appeared. The tranny still worked well, but it was very noisy. The problem stemmed from the external countergear setup that was protected by a plastic cover. Despite my efforts to prevent dirt from getting under the cover, it built up in the gears' teeth and even jammed the tranny once.

TRANNNY TRANSFORMATION

The Blue Eagle's transmission is far superior to that of its predecessor. It still uses 48-pitch gears, but in a much better design that incorporates a slipper clutch. The output ratio is 2.72:1, which is perfect for a racing truck. The slipper is in the drive system's primary stage and is driven directly by the motor. It's very similar to the Team Pit Stop slipper clutch that we featured in the April '91 issue. To adjust the slipper, change the spring tension or vary the number of pegs in the gear.

The new differential resembles the Eagle's, but its main gear is smaller because, in this transmission,

there are three internal gears instead of two. The new transmission features a brass primary gear that's mounted to the input shaft, which drives a nylon counter-gear. The brass delivers a very smooth performance, but it wears more quickly than nylon. Periodically check the brass gear for wear, and replace it when necessary to avoid damaging the gear further.

I'm glad Traxxas kept the externally adjustable differential. It can be easily adjusted by inserting a small Allen wrench into the gearbox case and turning the rear right tire. But be sure to keep dirt out by covering the diff-adjustment hole with tape!

DEAD ON!

With the Eagle, I had a problem with the steering. It wasn't horrible, but it tended to bump-steer because the steering rods ran directly from the servo to the steering blocks. With this type of truck, the rods have to be very long, and this threw off the system's geometry.

Way back in '87, *Car Action* reviewed Traxxas's first entry into the off-road world—the Cat. Though it didn't really excite racers, it was a start. Designed as an entry-level car, it was available as a kit or as a fully assembled model with the radio installed. For first-time R/Cers, it offered the fastest way to get onto the track. It had many features that were usually found only on more expensive cars—oil-filled shocks, independent front suspension and "real" radio equipment that could be used in other cars as the modeler progressed. No wimpy Z-bend linkages



BEFORE THE EAGLE LANDED

here!—all the rods had ball-links that reduced slop.

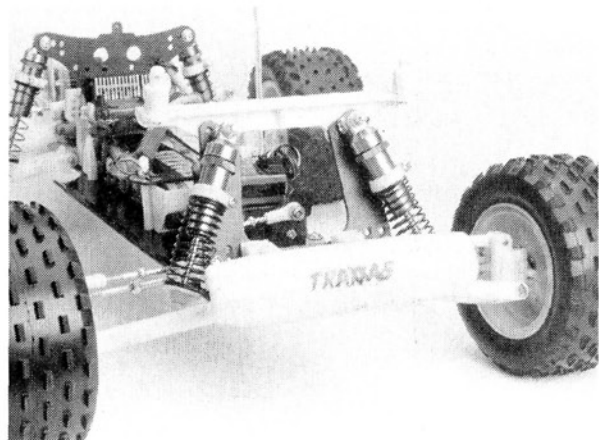
The rear suspension was a pivoting, solid-axle-type unit that had a lot of travel and, like the front end, was damped by two oil-filled shocks. This type of rear suspension isn't the greatest, but it's very durable and easy to maintain.

The Cat was chosen as one of *Car Action's*

Top Ten Cars two years in a row. Since then, Traxxas has produced many other cars—not all of them for entry-level racers. The Blue Eagle's victory at the '90 NORRCA Off-Road Nats showed the world that Traxxas has what it takes to go the distance.

To remedy this, Traxxas borrowed the bellcrank steering system from its earlier Bullet buggy. This bellcrank/idler-arm steering system is similar to those found on other successful racing machines. The length of the steering rods used is similar to the length of the suspension arms, and this, in simple terms, minimizes bump steer.

The bellcranks pivot on two aluminum posts that are mounted on the chassis. One of the bellcranks has an adjustable arm that's connected to the servo. It can be set at anywhere between 90 degrees and 180 degrees to the bellcrank (depending on where you mount your servo). A small turnbuckle connects the two bellcrank arms.



The Blue Eagle is a serious, all-out racing truck that's made of the best materials. Graphite shock towers with long front shocks, beefy front-suspension arms and turnbuckle tie rods are just some of the features that make this truck a winner!

ASSEMBLY

Assembling the Blue Eagle is easier than you might expect. The numerous parts are grouped logically for each assembly step. My only problem was with the rear arms, which rubbed against the edge of the chassis. To remedy this, I simply filed the chassis until there was enough clearance.

The detailed instructions contain many helpful racing tips, and there's also a comprehensive section on chassis set-up and adjustment. Traxxas doesn't only tell you what to adjust, but it also explains how each adjustment will affect handling. This is particularly beneficial to first-time racers.

RADIO GEAR

I dreaded having to pirate radio gear from one of my other cars, so I picked up a new Novak* NER-3FM 3-channel receiver. It's designed to operate with any FM surface radio, and I use it with my Futaba* PCM transmitter, which has seen many hours of racing. I had to turn the PCM switch to the PPM setting, because, in the PCM mode, the signal from the transmitter is only recognized by the receiver with which it came. With the Novak receiver, the switch must be set to the PPM setting. Only the fail-safe operation is lost, and I can live with that.

Type Racing truck
Scale 1/10
Sug. Retail Price \$350

DIMENSIONS:

Overall Length 17 inches
Width 12.25 inches
Wheelbase 11.25 inches
Front Track 10 inches
Rear Track 10.25 inches

WEIGHT:

Gross (with battery) ... 3 pounds,
15.18 ounces

BODY:

Type Chevy stadium truck
Material Polycarbonate

CHASSIS:

Type Pan
Material Graphite

DRIVE TRAIN:

Primary Gear
Transmission Gear
Differential Ball
Bearings/Bushings Ball
bearings

SUSPENSION:

Type (f/r) Lower A-arm with
upper control link
Damping (f/r) Oil-filled, coil-
over shocks

WHEELS:

Type (f/r) One-piece chromed
nylon
Dimensions (DxW) (f/r) 2.2x2
inches

TIRES:

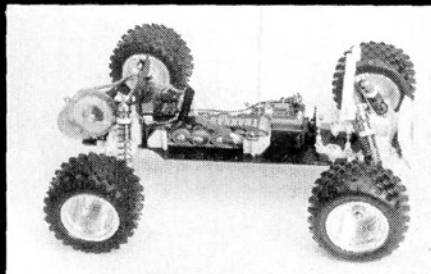
Front/Rear Pin-spike

ELECTRICS:

Motor 540/05*
Battery ... 6- or 7-cell stick pack*
Speed Controller None

T R A X X A S

Blue EAGLE



The Blue Eagle is Traxxas's top-of-the-line racing truck. With high-quality, race-proven parts, it can compete with any truck (kit or conversion) on the market.

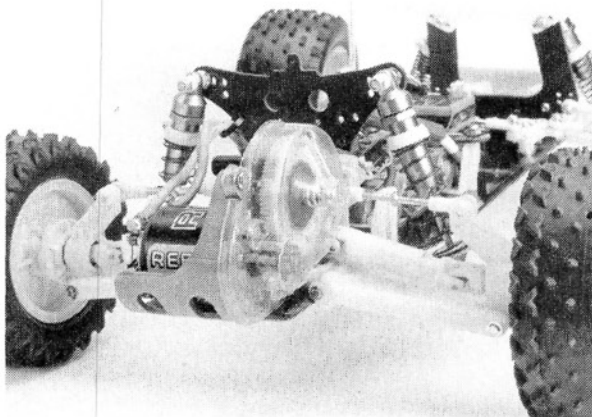
OPTIONS TESTED:

Futaba 3PB PCM radio; Novak NER-3FM receiver; Tekin 411P ESC; KO Propo PS701 servo; Reedy Mr. D motor; Team Bruckner* 6-cell SCR battery pack; DA Graphite* battery brace; Schumacher Vee-4 tires; Losi front stagger-rib tires; Litespeed* Tuff-Stuff—protective chassis material; JG King Cab body.

COMMENTS:

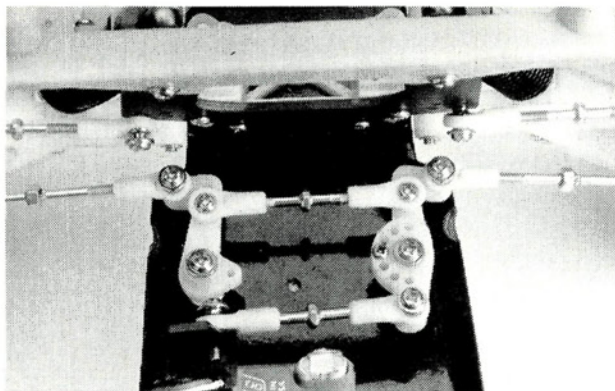
The Blue Eagle's new parts raise its performance to well above that of the original Eagle. The new tranny is very smooth and seems silent compared with the older Eagle tranny. The slipper clutch allows smoother takeoffs on low-traction surfaces, and it prevents excessive drive-system wear. The Blue Eagle is a solid performer that shouldn't be overlooked.

* not included

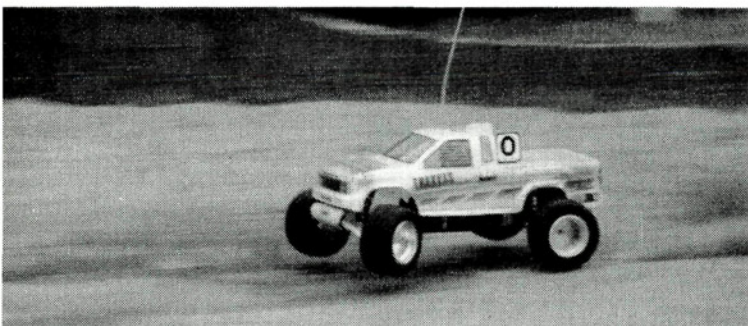


With a fully adjustable ball diff, 48-pitch precision-molded gears and an integral slipper clutch, the Blue Eagle tranny is designed for efficiency and reliability. A Reedy Mr. D, 14-turn, quad modified motor supplies the power.

A heavy-duty bellcrank steering system is standard on the Blue Eagle. Its chassis is made of a coated graphite material.



For the speed controller, I pulled the Tekin* 411P out of my RC10. I was trying to avoid having to dismantle a car to finish this truck, but it's sometimes inevitable. For steering, I chose KO's* PS701 servo. Why use a Futaba radio system with a KO servo? It was the only servo I wasn't using elsewhere. The bellcrank steering system doesn't have a built-in servo-



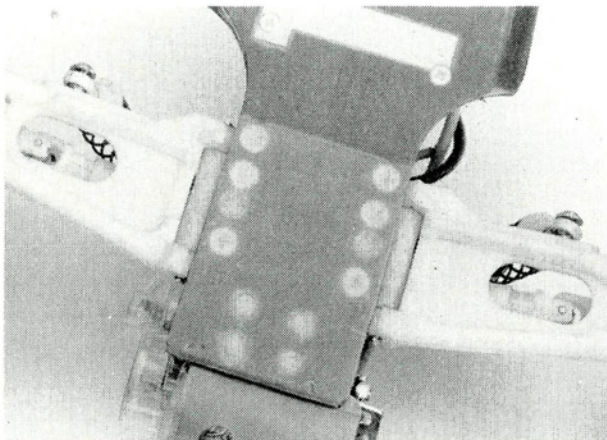
.....
"The new transmission was noticeably quieter than the Eagle's, and the slipper clutch made it easier to deal with the low-traction areas."

saver, so I installed one directly to the servo.

For the power department, I turned to Reedy's* Mr. D 14-quad. I've used it for a while in other cars, and I was satisfied that it would have enough power. For batteries, I chose Sanyo* 1400mAh SCR cells from Bruckner Hobbies. This setup gives run times of more than 4 minutes, so duration is no problem.

The stock tires work reasonably well, but I decided to try a different set to see how they'd perform. For the fronts, I chose Team Losi's* stagger-ribs, and for the

Tuff-Stuff—Litespeed's new adhesive chassis-protection material—prevents the Blue Eagle's underside from being damaged.



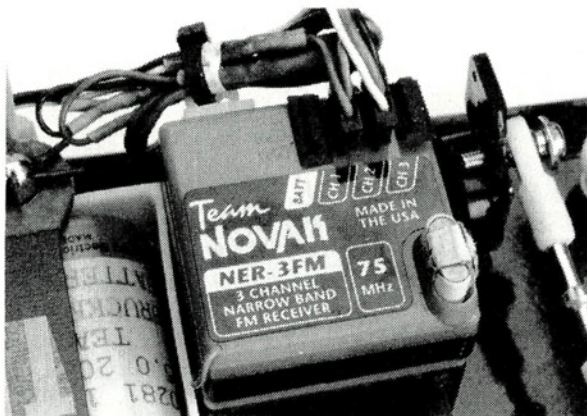
rears, I chose Schumacher's* Vee-4s. I've successfully used the stagger-ribs on my Eagle, but I wasn't sure how the Schumachers would work.

The body included with the Blue Eagle kit is identical to the Eagle's. It's strong, but it lacks the details I

like. I found a beautifully painted JG* King Cab replacement body in the *Car Action* store room, and the Ayatollah of Radio Controlla was good enough to let me use it for this review. It's narrow and sits rather low on the chassis; I like that. After that, it was time to hit the track.

TEST TIME

For the initial test, I drove the car in my living room. After 10 feet, it stopped. This had never happened to me before with the PCM, so I was concerned. It turned out that the channel-88 crystals, which had worked well in the PCM mode, just wouldn't cut it in the PPM mode. The radio was originally tuned for channel 80, so I needed something closer to it than 88. I borrowed



Novak's new NER-3FM receiver was used in the Traxxas truck. It's the first after-market receiver that works with Futaba's PCM and Airtronics' Caliber FM radios.

a friend's channel-84 set, and my problems were over.

The first real test came at the local track, where Junior Associate Editor Alex Strouthopoulos and I set out to shoot some photos. The Blue Eagle's speed and handling were very good, although it showed a slight tendency to push. The new transmission was noticeably quieter than the Eagle's, and the slipper clutch made it easier to deal with the low-traction areas. We ran a couple of packs through the truck and called it a day.

That night, I noticed a small problem. I had forgotten to replace the tape that goes over the diff-adjustment hole in the gearbox case. I opened the gearbox and saw a little dirt, but I also saw something worse!: one of the three bolts that hold the differential gear together had worked its way out and was loose inside

(Continued on page 123)

SCOPING OUT

by JOHN RIST

Novak's 410-M1c

I WAS really excited when I got my first look at Novak's* 410-M1c racing speed controller because there were lots of new and different items to examine. The 410-M1c is small, and light. There are five FETs for forward, in - stead of the usual six that are found in many of the older controllers. The unit appears to have two braking FETs, but one of the transistors is really a Schottky free-wheeling diode. The diode permits a high-frequency controller to recharge the battery when you back off the throttle. The 410-M1c comes in a new, brightly colored box that includes a screwdriver, decals and an instruction book.

New and different doesn't necessarily mean new and improved so, intent on finding out which features were just new and which were truly improved, I set out to run the 410-M1c through the "Scoping Out" routine.

A thorough inspection revealed a serious racing-style speed controller with the following features:

- forward-only with brake
- five FETs for forward and one FET for braking
- a Schottky free-wheeling diode for recharging
- a three-wire system for low resistance
- a high-frequency motor control
- current-limiter control adjustment
- electronic thermal-overload protection
- a battery-to-motor wire, a heat sink and

Novak's five-input plug system.

My engineering background makes me curious about new electronic gadgets. The 410-M1c is easy to open: simply remove the four screws in the bottom. The top and bottom of the case are sealed with an O-ring, which should keep out the dirt during bugg y racing. In fact, this model has a better seal than most other Novak models because the wires exit from the top of the case instead of from the side, and this avoids having a side exit hole for the wires. (On my other Novak controllers, the O-ring seems to fit the hole poorly.)

Inside the 410-M1c are two printed-circuit (pc) boards stacked on top of each other with a host of surface-mounted components on both sides. Novak has done a super job of stuffing a multitude of functions into a small package. (I work with satellite electronics, and this new generation of speed controller looks as if it came straight out of a Voyager satellite.) On looks alone, the 410-M1c should be one mean speed controller.

LAB TESTS

I took the unit to my "Scoping Out" lab to determine whether it was worthy of being called a racing speed controller. Before I hooked it up, I read the instruction book, which was thorough and had many good installation drawings. The pictures show the 410-MXc instead of the 410-M1c (the book covers both controllers), but they have the same general features,

so I didn't find this confusing.

VOLTAGE-DROP TESTS

With the 410-M1c connected and running, I ran the resistance test. Resistance is hard to measure directly, so I measured the voltage drop across the speed controller while passing 12 amps of current through it. The voltage drop across a speed controller divided by the current passing through it equals its resistance. I always take this readings at two points: first, from the end of the motor wires to the end of the battery wires; second, 2-

• THE SCOPING OUT LAB •

John Rist's lab consists of:

- an oscilloscope
- a digital voltmeter
- a resistor load bank
- a 6V 30A electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors, which can be switched on and off one at a time to vary the load between .6 amp and 20 amps, but the standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent .01-ohm resistor. By measuring the voltage drop across this resistor, the current-meter's reading can be double-checked. Of course, the lab power supply provides the test current.

Team Astro Sweeps The WORLDS

In Truck Pulling and Drag Racing Astro Motors are almost unbeatable. Astro motors have powered more trophy winners than all other makes combined.

IEDA Drag Racing World Championships Drag World Colton, Ca. Mar.1,2,3, 1991

National Speed Records

2.013 Sec.....Pro CompJohn MillsAstro Top Fuel I Motor
2.033 Sec.....Top Fuel FunnyCalvin GrantAstro Top Fuel I Motor
1.986 Sec.....Top Fuel RailMike OgleAstro Top Fuel I Motor

IEDA World Winners

1st Place.....Pro CompCalvin GrantAstro Top Fuel I Motor
2nd Place.....Pro CompJohn MillsAstro Top Fuel I Motor
1st PlaceTop Comp ElimMike RussoAstro Top Fuel I Motor
1st PlaceTop Fuel FunnyM.R. OgleAstro Top Fuel I Motor
2nd Place ...Top Fuel FunnyEric WeimsAstro Top Fuel I Motor
1st Place.....Top Fuel Dragster ...Alan MaynorAstro Top Fuel I Motor
2nd Place.....Top Fuel Dragster ...Rick Albiscos.....Astro Top Fuel I Motor
2nd Place....Unlimited Dragster .Roger RoseAstro Top Fuel II Motor

NR/CTPA World Championships Champaign, Il. Sept. 30, 1990

1st Place..... 2WD Modified.....A. JanickiAstro Pullmaster I Motor
2nd Place ... 2WD ModifiedDutch EsgroAstro Pullmaster I Motor
3rd Place 2WD Modified.....David HesterAstro Pullmaster I Motor
1st Place.....2WD Open IKyle Haynes.....Astro Pullmaster I Motor
3rd Place.....2WD Open IMarcia Arman ...Astro Pullmaster I Motor
1st Place.....2WD Open II.....Jim Bee.....Astro Pullmaster II Motor
2nd Place.....2WD Open II.....Scott Weigel.....Astro Pullmaster III Motor
3rd Place ... 2WD Open II..... G. KinseyAstro Pullmaster II Motor
1st Place..... 4WD Open ISean CullenAstro Pullmaster I Motor
2nd Place.... 4WD Open IDon Fisher.....Astro Pullmaster I Motor
2nd Place ... 4WD Open II.....Dale ArmanAstro Pullmaster II Motor

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inches along the wires. The first reading tells me the resistance of the stock controller; the 2-inch reading is used to compare controllers. The end-to-end voltage drop at 12 amps was .08 volt, which equals a resistance of .013 ohm. At the 2-inch point, the reading was .06 volt—.005 ohm. A quick check to compare these figures with those of other speed controllers revealed that these figures put the 410-M1c right up there with the best. To say the least, I was surprised to find the resistance readings this low because the controller uses only five FETs to handle the current. My hat is off to the Novak engineers who have produced a world-class speed controller with only five FETs. As I've said many times before, the size of the wire, the quality of the solder joints, and the resistance of the pc board are as important as the quality and number of FETs. It's obvious, however, from my tests that Novak uses super-high-quality FETs to achieve this low resistance.

LET-IT-COOK TEST

I jacked the current up to 21 amps and let the controller run wide open for 15 minutes. I run this test with the heat sinks in place because it's hard to tell where Novak has placed the heat-sensing element. With the heat sink installed, the heat is distributed evenly, and the thermal shutdown will work no matter where the heat sensor is located. I don't permit any cooling air to blow across the heat sink. After 15 minutes, I checked the heat sink and found that the controller was quite warm, but not hot. This was no surprise, considering the low resistance readings I had obtained earlier. If you place the 410-M1c where it receives plenty of cooling air and you use the heat sink provided, it should easily handle modified motors.

(Continued on page 76)

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DEAD-SHORT TEST

Using two alligator clips, I clip a piece of monster wire right across the motor wires. At this point, the current jumps to 40 amps (the limit of my power supply). I run this test with the heat sink in place, but I don't use any cooling air. I usually run this test for a minute or so, but considering how well the 410-M1c had done so far, I decided to let it run for 4 minutes. I chose this time limit because this is the length of most races. After 4 minutes, the 410-M1c was very hot, but it never was hot enough to trip the thermal shutdown.

If you do a little calculating, you'll find that a 1,700mAh battery pack will deliver 40 amps for only 2.4 minutes. The 410-M1c should withstand a lot of abuse, including burned-out motors and jammed gears. If, however, your car isn't running well, shut it down and find the cause of the problem, because with the power available in a modern Ni-Cd battery pack, it's easy to destroy some very expensive equipment.

Before I left the test bench, I wanted to play with the current limiter, so I removed the short and let the current drop back to 20 amps. While I watched the output on my oscilloscope, I cranked up the current-limiter potentiometer from maximum to minimum. At the minimum level, the 410-M1c's output went from full bore to partial throttle—a good indication that the current limiter has a wide range and should work.

NOVAK 410 M1c

DIMENSIONS:

Height	0.75 inch
Width	1.4 inches
Length	1.58 inches
Weight with wires	1.9 ounces

TUNING:

Access to Controls	Excellent
Ease of Adjustment	Very Good

PRICE:

Sug. Retail Price	\$175
Warranty	90 days

ELECTRICAL:

(Manufacturer's Specs)

Max. Voltage	10 cells
Min. Voltage	4 cells
Max. Current	Unlisted

Continuous Current	250 amps
Resistance	0.0015ohms

TEST PARAMETERS:

Voltage	6 volts
Current	12 amps

TEST RESULTS:

Voltage Drop end to end of wires	0.08 volt
Voltage Drop at 2-inch point	0.06 volt
Resistance to end of wires*	0.013 ohm
Resistance at 2-inch point*	0.005 ohm
BEC Voltage, 6-cell pack	5.63 volts

*Voltage Drop/Current = Resistance

COMMENTS:

Despite its low FET count (five instead of the usual six to 12), the 410-M1c has very low resistance and should handle modified motors well. Its high current-handling ability is the result of good design and very large motor wires and battery wires. The 410-M1c output frequency switches at 2500Hz instead of the usual 60Hz found in most controllers. This HF output reduces the motor's armature wear, increases run times, reduces motor heating and provides smoothness and control in the lower throttle ranges. The braking action is strong, and the range of the current limiter circuit is wide enough to allow you to set your acceleration to suit almost any track.

I hard-wire my motor, and let it dangle on the end of its wires so that I can clean it between races. I also have a servo tester called a Pit Stop radio (see the March '90 issue of *R/C Car Action*) that allows me to operate my electronic speed controller without a transmitter. This way, I can immerse the motor in a jar of Bolink* Electro Whirl motor cleaner, run it slowly and clean it without damaging the bushings.

There's one hitch in the 410-M1c's installation: it's a three-wire controller, so I have to run an extra red wire (supplied by Novak) from the

IN-CAR TEST

With the bench testing completed, it was time for the "fun part." I mounted the 410-M1c in a car and headed to the racetrack!

Right now, the hot item in the Rist racing stable is a RC10L pan car. I run it at a local indoor carpet track, which is a large, flat oval. It's equipped with a B&R* Bullet stock motor, which is renowned for its radical timing, high current draw and awesome horsepower. To feed this monster, I have a collection of 6-cell Sanyo* 1,400mAh packs.

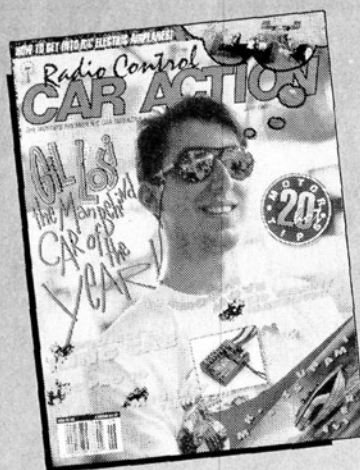
It was easy to fit the small 410-M1c into this car. Since the wires exit at the controller's top, they can be kept short but still reach the battery pack. I use Litespeed* connectors to join my batteries and my speed controller. They allow only minimal voltage loss, and their price is right. I don't like motor connectors, so

battery to the motor. It's almost impossible to insert two large wires into the contact of a Litespeed connector, so I remove about 75 percent of the strands from the end of the red wire that comes out of the controller. I also cut 25 percent of the strands off the end of the battery-to-motor red wire. Then, I twisted these two wires together, inserted them into the Litespeed contact and soldered them. Although it's difficult, the contact with the two wires attached can now be inserted into the red connector shell. I removed 75 percent at the end of the controller's wire and 25 percent at the end of the motor wire because the object was to get the juice to the motor. The speed controller, in fact, uses very little current. The only wires that carry heavy current are the red battery-to-motor wire, the black battery-to-controller wire and the blue controller-to-motor wire.

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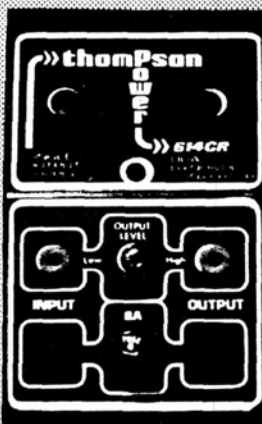
With the controller installed and the batteries charged, I headed for the track. When I put the car on the track and put the pedal to the metal, it was obvious that this controller had the right stuff. A high-frequency controller offers longer run times; your motor will also run more coolly, so its brushes will last longer. I think the controller's biggest asset, however, is its smooth throttle response. Even during the holeshot from the line, this smoothness prevented wheel spin.

The 410-M1c did have one quirk: when I let the battery run all the way down, I lost the ability to steer before the car had stopped moving. By this time, however, the car had slowed to a crawl—dead batteries! Run times were consistently good (always more than 4 minutes with fairly high gearing), and a check of the heat sinks after each run verified that this controller has really low “on” resistance. The heat sinks were very warm, but they were never hot. Our track doesn't put a strain on the brakes, so I played with them to see how they would work. They were very strong and should be adequate on even the tightest roadcourse.

Next, I decided to play with the current-limiter. I didn't have my digital voltmeter with me, so I decided to try several settings to see how the car would react. I tried the minimum setting, but the car didn't run properly. The motor was erratic, and the steering was “twitchy.” When I set the limiter at the halfway point, the car behaved normally, but acceleration was definitely “soft.” Top speed seemed OK, but it might have been slightly slower.

I concluded that the current-limiter works very well on this controller. If you race on slippery off-road tracks, it should be possible to fine-tune this controller for the amount of punch you want out of the corners without limiting your car's top speed. If you own a digital voltmeter, keep a log of which setting works best at which track by measuring the voltage at the current-limit test point. If you record this reading with details of the track's conditions, it can be a starting point for

(Continued on page 130)



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PRO DYNO

(Continued from page 34)

has a Dyno power rating of 400 and it dumps on the last lap, a motor with a power rating of 440 will get you across the line with time to spare. Ideally, you want both motors to have the same rpm reading to maintain the gear ratio. If the rpm reading is higher on the second motor, a smaller pinion may be required; if the rpm is lower, you'll need a larger one.

The Dyno is so sensitive that it can measure minute changes made to the brushes, springs and degrees of timing. If you experiment a little with these, you'll increase the efficiency and overall power of your motor.

The instruction manual indicates which load settings are most suitable for the various classes of racing, but I test each motor at every load setting to see how it will perform on different parts of a track. For example, the 10A setting is a good indication of how a motor will perform on a straightaway (though the 15A setting may be required for hot modified motors); the 30A setting indicates how well the motor will pull out of turns; and the 20A and 25A settings are suited to mid-

range performance. If you need a motor that pulls well through turns, look for one that has a higher power number at the higher load settings, or alter the motor's timing and brushes to improve acceleration. The possibilities are endless!

The only potential fault in the Dyno's design is that it doesn't measure how quickly a motor accelerates. When testing a modified motor with different wind configurations (e.g. single, double, triple wind), the weight of the armature and other factors affect how quickly the motor comes up to speed. The LAVco Dyno is only capable of testing the motor's performance once it's up to speed. From the information the Dyno provides, you can estimate how quickly the motor's going to accelerate but there's no actual method for testing it.

As with its precision battery-matching devices, LAVco's Pro Dyno sets the standard for the industry. Essentially, the Pro Dyno is a professional-grade dynamometer that's available to the general racing public—not just to manufacturers or a select group of factory teams. At \$600, the Pro Dyno is likely to be out of the financial grasp of the average racer. When car kits cost \$200 and a top level

radio commands about the same price, \$600 may be a little hard to swallow. Maybe club racers can pool their resources and buy one to share. LAVco also manufactures a less expensive version of the Pro Dyno called the Sport Dyno, which retails for \$350.

**Here are the addresses of the companies mentioned in this article:*

LAVco, 3150 E. La Palma, Unit B, Anaheim, CA 92806.

Stormer Racing, P.O. Box 126, Glasgow, MT 59230. ■

TEAM CAR

(Continued from page 42)

clarified the situation: the 94143 was designed for 1/10- and 1/12-scale on-road racing, not off-road. Airtronics' servo no. 94141 is strong enough to handle off-road action, so we installed one. It's the same size, and it has the same torque and speed characteristics, but its gears are *metal*.

Back at the track, after a few laps, I was very impressed by how smooth this car is and how quickly and surely it comes out of corners. My initial setup seemed to be in the ballpark, but the Team Car's rear

(Continued on page 98)

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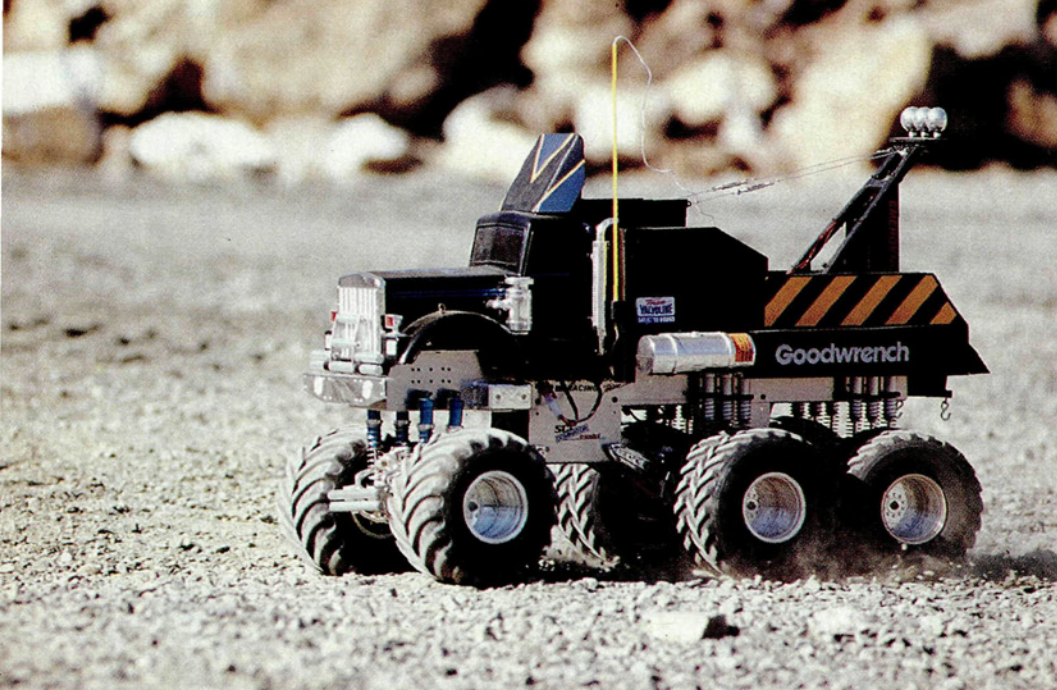
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turned into 21 pounds and more than \$1,000 worth of Wroad Wrecker hop-ups. (The "w's" are silent, of course; now do you understand why they call me "Bad Brain"? Who else would put a "w" in front of the word "road"?)

WROLLING CHASSIS

If you read my "Dirt Digest" column in the July '91 issue, then you know that Sassy Chassis* introduced its prototype of the SST three-axle Clod chassis at the WRAM Show last February. In March, I convinced the company to send me one before it went on sale so, technically, I'm using the prototype chassis. (Sassy didn't

TAMIYA'S* BULLHEAD is a great addition to the Clod Buster family, but it seems as though something is missing from the rear of its cab. When I began

this project, I just wanted to add a few things to the Bullhead to make it look more realistic. All right—I admit it—I got carried away. What started as a few "visual" additions

wroad wrecker

by BILL O'BRIEN

even have packaging for it at the time; it came wrapped in plastic bags!)

Prototypes are often modified before they reach the production stage, but I really don't know what (if anything) Sassy could have changed on this chassis. To my simple mind, if all the parts that are supposed to be mounted on a chassis fit properly, then the chassis is flawless; and this one *is*

flawless. Although it was designed for the Clod Buster, and some of the Bullhead parts aren't compatible with it (e.g., the

!nordium warrior!



Wroad Wrecker

front bumper and the rear body mounts), I only have great things to say about this chassis!

It has a built-in lift kit. The wide front stirrup and the narrow rear stirrup (which is meant for use with only one axle) are drilled so that they can be mounted in one of three vertical positions, ranging from normal height to nose-bleed altitude. I used the middle lift position, but if you're not afraid of heights, go for the full lift.

I was so impressed with this chassis that I ordered Sassy's Clod Buster steering systems. (I use three of them on the Wroad Wrecker.) The components are

I couldn't even think about using a standard steering servo to move six wheels around, so I use a Futaba* S134 1/4-scale servo. I had to re-drill the servo-mounting holes in the chassis' front stirrup, but it was worth it.

WREALLY SHOCKED AND TIRED

I use Sassy's long triple shocks (also prototypes) on the two rear axles. A few days after the shock kit had arrived, a Sassy representative called to tell

me that the lower mounts had been modified slightly to provide more clearance for the axle braces. Although the company offered to replace the ones I had bought, I thought they were crazy. The prototypes fit rather snugly, but they

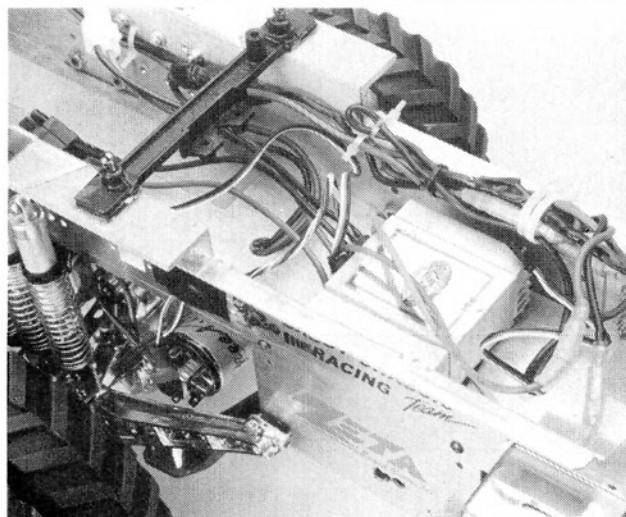
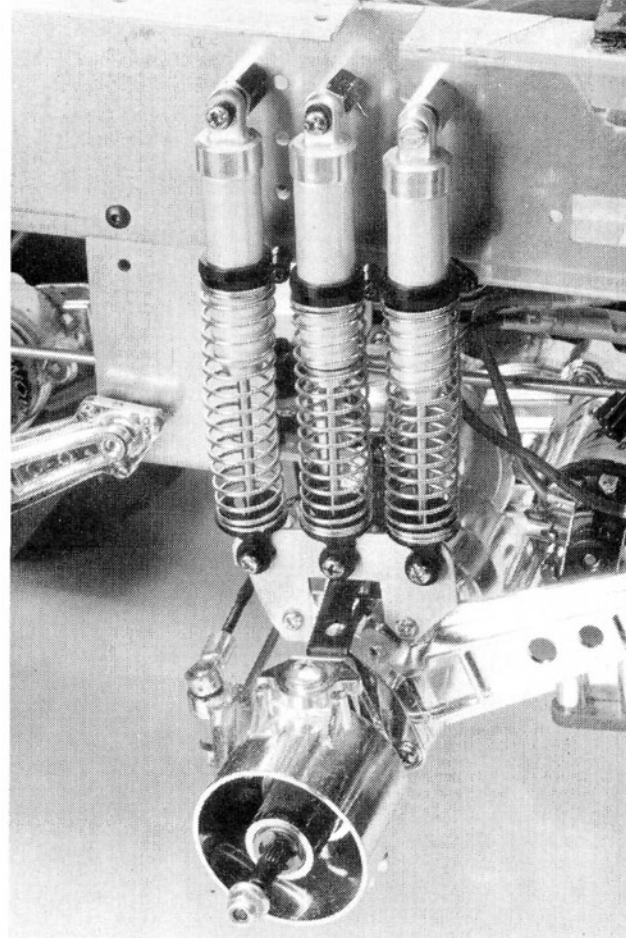
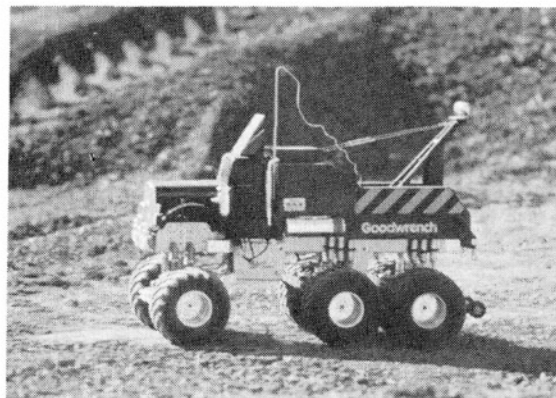
fit. Besides, it took me a while to install and adjust them properly, and I wasn't going to disassemble the suspension for anyone! I use the blue Trinity* Clod shocks up front because they look great.

Tires and wheels complete the "wrolling" chassis. Up front, I use the stock Bullhead chrome wheels and tires, but the rear axles received the Imex* treat-

ment—thin dual tires mounted on specially designed wheels that are no wider than the stock wheels.

■ **Top:** A special shock-mounting bracket is included in Sassy's triple-shock kit.

■ **Bottom:** A PDI Turbo Zeta speed controller fits snugly in the Sassy Chassis. To keep it cool, optional PDI heat sinks were attached to its case.



made of aluminum, so they're very strong and rigid. They don't provide any servo-saver action, though, so your servo will need one of those giant CRP* or Kimbrough* servo-savers. I also bought Sassy's beefier steering-rod kit. I won't say that these rods can't be bent, but they're very durable, and they're also the correct length for the long chassis.

PARTS LIST

- **Autographics** assorted decals
- **Du-Bro** 3/4-inch tail wheel
- **CRP or Kimbrough** giant servo-saver
- **ESP** Clod tube bumper; wheelie bar
- **Futaba** S-134 1/4-scale servo; FP-148 servo; 6NFK radio
- **Imex** dual Clod wheels and tires
- **Jet** thick CA
- **Kyosho** Blizzard flashing light kit; Big Brute fog lights
- **Pacer** Zip Kicker
- **PDI** Turbo Zeta ESC with heat sinks
- **Plastruct** polystyrene sheeting in several sizes
- **PTI** 6-cell 1700mAh battery pack
- **Radio Shack** 5V reed relay; lever switch
- **RAm** flashing-light module; lights
- **Sassy Chassis** SST Clod chassis; shocks; steering kit; SST steering rods; triple-shock mounts
- **Sharpie** pens
- **Tamiya** Bull Head; headlight kit; flashing light kit
- **Trinity** Clod shocks; Monster Mash motors

Wroad Wrecker

Three small pc boards were needed to control the flashing lights, which consist of two Kyosho Blizzard flashers and one RAM flasher.

After all, the big trucks run "duallies" out back. To prevent damage (not to the Wrecker, but to anything it hits!), I installed ESP's* Clod Tube Bumper. I also fitted an ESP wheelie bar to the rear.

WRADIO WAVES

I have to admit it—I was stuck for a radio. This beast needed at least

(e.g., the Futaba 4NBR) wouldn't work because the channels for the lights and the lift would be controlled by slide pots rather than by switches.

Futaba's 6NFK airplane radio fit the bill perfectly. It has four stick-controlled channels, a full-servo-throw channel and a split-throw channel. In one position, the switch moves the servo through its full range of travel from the center to the left, and in the other position, it moves the servo through its full range of travel from center to the right. I use the first "switched" channel for the lights, and I reserve the other one for the towing winch.

I hope my use of the 6NFK 6-channel FM airplane radio causes you to raise your eyebrows in astonishment. It's forbidden to use radios that operate on model aircraft frequencies for R/C cars. (The last thing you want to do is to jeopardize someone's model airplane by using air frequencies on the ground. If you do, you could cause it to crash; this is very dangerous!) Long before I bought the 6NFK, the people at Kraft Midwest* assured me that they could convert it to 75MHz

operation so that I could use it to operate surface vehicles safely.

WREAL MONSTER POWER

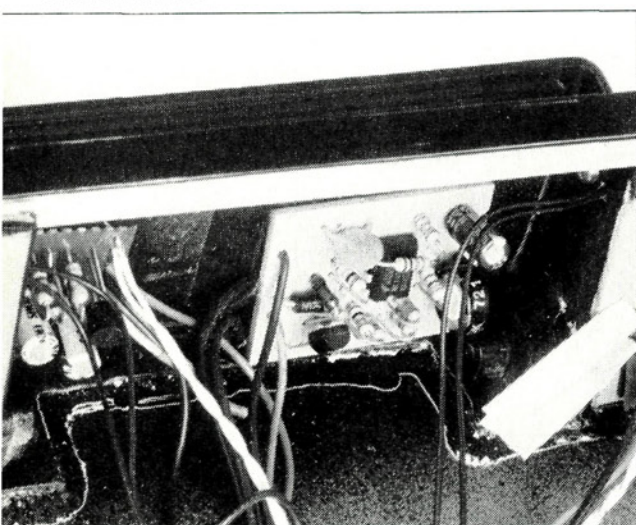
Initially, I used an SCI* Dominator speed controller to operate the truck and its three Trinity Monster Mash motors. In my early tests using a 2-channel surface radio, however, I jammed the middle set of wheels. This caused the truck to stop, and the Dominator gave up the ghost under the horrendous strain caused by three motors going nowhere at full speed. Although SCI repaired the controller and returned it to me in less than 10 days, I had decided to use the Dominator in another project.

In its place, I use a PDI* Turbo Zeta controller to which I attached a pair of humongous heat sinks (PDI option). The speed controller stretches across the width of the chassis. With the controller's aluminum case, the aluminum chassis becomes a huge heat sink. This isn't really necessary because my Turbo Zeta has never broken a sweat, but I'd rather be over-protected than caught "shorted-out."

Originally, I planned to use an odd selection of batteries for the Wroad Wrecker: six Radio Shack extended-capacity D-cell Ni-Cds for reverse and the lighting system and nine Sanyo* 4400mAh D-cells for forward. I soon discovered that running a truck that steers with six wheels takes

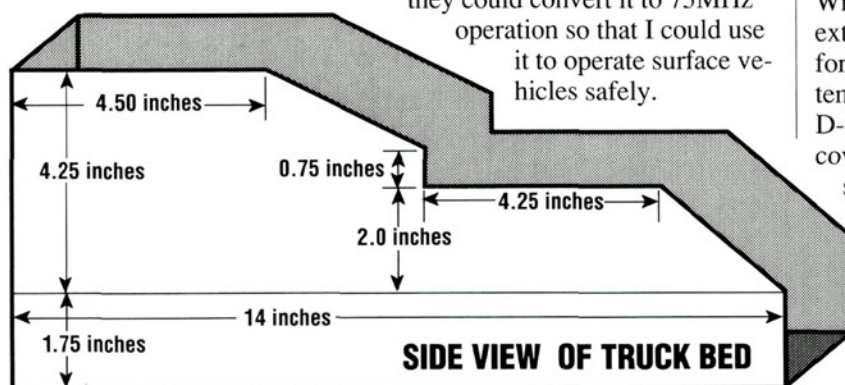
practice, and it's best not to put too much power into it at first. So I powered its forward motion with a PTI* 1700mAh 6-cell pack.

(Continued on page 140)



four channels, but I only planned to use two of them for speed and steering. I wanted to use the other channels to control the lights and the lift mechanism that I planned to add. A 4-channel surface radio

For those of you who would like to build your very own "Wrecker," here's a diagram showing the approximate size of the truck bed.



CAR ACTION PRESENTS THE '91-

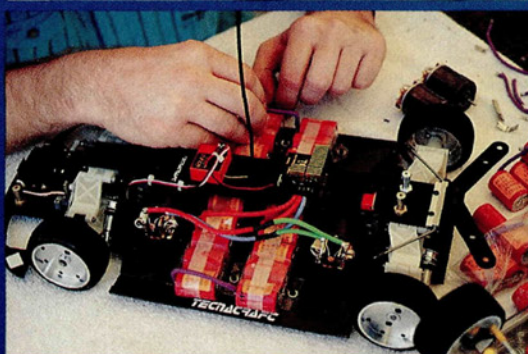
RC THUNDERDOME

High-Speed Hysteria

by JOHN HUBER

WHEN most people think of California, they think of sunshine, fast cars and beautiful girls (not always in that order). At last year's Thunderdome, there was definitely no shortage of the first two items, and although the place wasn't packed with beach beauties, Ms. Thunderdome completed the scene. Temperatures reached 100 degrees under the blazing sun as cars hit speeds close to 70mph.

The 950-foot track was built for bicycle racing back in the '60s, and it's still used for this purpose, but this weekend, no bikes were allowed. Two huge tents were pitched for the drivers' pit area, and the classes included Amateur $1/10$ Stock, Modified and an Invitational Class for the pros. Amateur drivers ran 4-minute heats, and the pros ran 12-minute heats (with battery changes).



■ Above middle: Kent Clausen's Tide car heads for the checkered flag in the Invitational Class.

■ Above: Joel Johnson's dual-motor, 20-cell monster is prepared for the Insane Speed Run. Though the car had some technical trouble that prevented it from making a good run, many people think it went faster than 70mph for a short time..

The main event for the pros lasted 30 minutes, which was just short of a marathon (26 miles).

The pro-class drivers could also enter the Insane Speed Run, which was, to say the least, insane. The cars had to be $1/10$ -scale electrics with store-bought bodies, but there were no rules governing motors, batteries, or weight. Some very impressive cars showed up to challenge Kent Clausen (last year's victor), but no one could beat his 70.1mph record. Some cars simply blew over or spun out doing 60mph or more; some crashed and were totally destroyed; others finished totally unscathed.

Joel Johnson's twin-motor car was the most impressive. On a test run, he opened up his car as it passed the lap-counting bridge, and it accelerated even faster than he had anticipated. As it reached

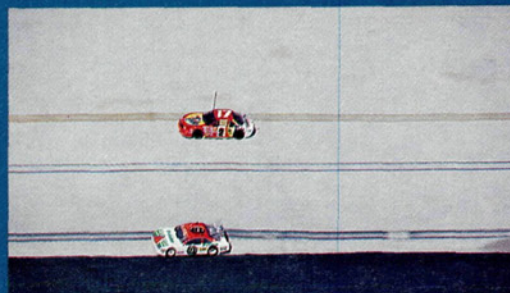
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THUNDERDOME

the first turn, it was going so fast that no amount of steering could guide it. It smashed into the wooden barriers and sent nearby spectators scattering. Although the car was unable to complete a lap for an official speed, many think that it was doing over 70mph.

The Thunderdrome is definitely one of the highlights of R/C racing. Not only can you meet the "big guns," but you can also watch them compete on the fastest track in the country. This year's Thunderdrome will be even more insane than last year's. I know that Clausen's speed record will be broken, but by how much? No one will know until September. If you're thinking of entering, or attending a big race this year, this is the one!

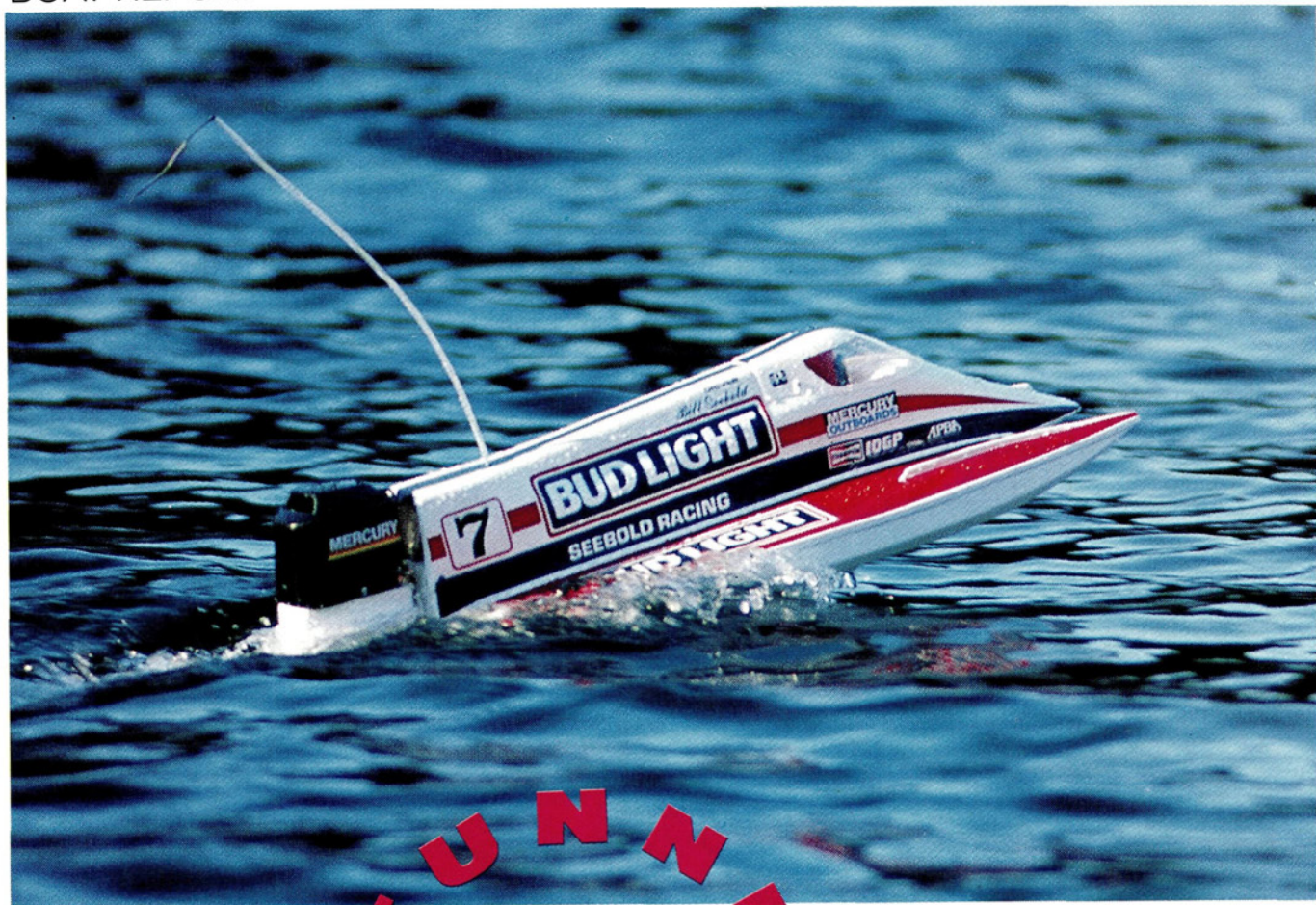
The '91 RC Thunderdrome will be held on September 13-15. For an entry form, see pages 120-122.



■ Top photo: The enormous size of the Thunderdrome track is clearly shown in this aerial shot. Covered pits and parking are provided for the entrants. ■ Middle left: Associated's top guns duked it out in the Insane Speed Run. Cliff Lett (right) won the event, but he didn't break Kent Clausen's 70.1mph record. ■ Above right: Publisher Louis DeFrancesco, Ms. Thunderdrome and Steve enjoy the action from the infield.



■ After racing for 30 minutes, the drivers in the Invitational A-Main were glad to put down their radios and pose for a picture.



PHOTOS BY JOHN T. HIDY & YAMIL SUEO

Bud Light

• M • R • P •

TUNNEL HULL

by JOHN T. HIDY

WHAT'S RED, WHITE and blue and quickens your pulse? Have you driven a Bud Light, lately? If not, then you've definitely missed the boat. After I started building MRP's* Bud Light Tunnel Hull, I developed an appreciation for fast-electric boats. By nature, I'm a scale-boat, putt-around-the-pond kind of guy; I enjoy looking across the water at a model boat to judge the accuracy of its scale appearance and observe its speed.



formula fun

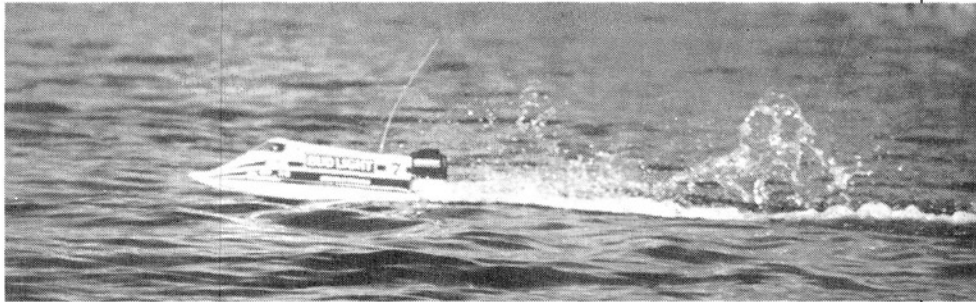
OPENING IMPRESSIONS

When I opened the Bud Light Tunnel Hull kit, I was impressed. MRP obviously went to great lengths to research and develop this scale, fast, electric, outboard-tunnel-hull kit. Approximately 80 percent of the kit was assembled, including the hull, the outboard-motor drive and the stepped-microswitch speed controller.

I was disappointed by the assembly manual, which I read from cover to cover before I started construction. It assumes that the builder isn't a novice, and therefore, it doesn't give "step-by-step" instructions. Regardless of a model builder's proficiency, a kit's instructions should be well-organized.

you've properly sealed and installed the radio receiver.

- Don't cut and mount the canopy as shown in the manual (photo 8, page 4). If you do, you'll need extra screws to hold the hull's cowl in place. Instead, test-fit the canopy and allow about 1/8 inch of it to overhang the cowl. The cowl will slip under the canopy and be held by pressure, but it will need two screws in its rear to hold it in place (as shown in photo 10).



SPECIFICATIONS

Type: Hydro tunnel-hull racer

Length: 27 inches (including outboard motor)

Beam: 9 1/4 inches

Weight: 3 pounds (with batteries)

Hull Material: ABS plastic

Power Req'd: RS550-SH direct-drive outboard*

Prop Size: 1.25x1.75-inch (diameter/pitch)*

No. of Channels

Req'd: 2 (throttle and steering)

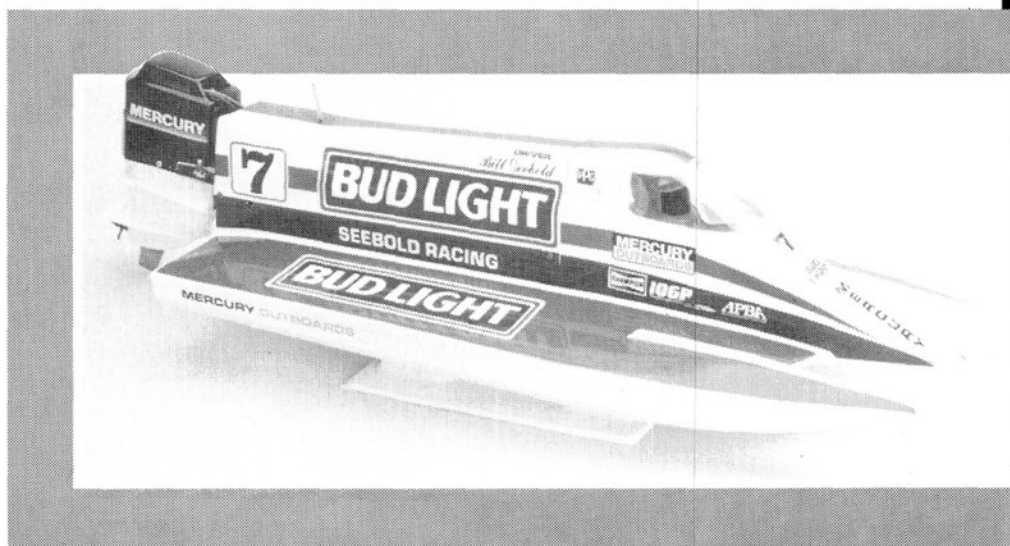
Sug. Retail: \$209.95

Features: the Bud Light's batteries can be moved forward or aft to trim the boat's center of gravity to suit the water conditions. The Mylar stick-on decals are of excellent quality and are identical to the full-size boat's markings.

Comments: the instructions are

marginal and hard to follow. All the construction steps must be carefully thought out before any building begins. The Bud tracked very straight, required little trim to come up on plane and made controlled, precise turns. It would be a wonderful addition to anyone's fleet.

*included



The kit's Mylar, stick-on decals really dress-up the model. Use soapy water to "float" the decals into place, and take your time.

BUILDING HINTS

Here are some hints to help you avoid possible construction problems:

- The speed controller has a one-page instruction sheet, but don't refer to the diagram on it for directions on how to position the servo, because the servo in the diagram is reversed! Install the servos as shown in the assembly manual.
- Position the speed controller's cam according to the manual's instructions, but don't install the controller until

THE HULL

The hull, the motor/tail-shaft assembly casings and the cowl are of molded, white, ABS plastic. The cowl had a minor vacu-formed crease that I had to sand and fill. Trimming the lower casing halves that are attached to the tail-shaft assembly was a little tricky, and they also had a few, larger, vacu-formed creases that required a lot of trimming and sanding.

MRP BUD LIGHT

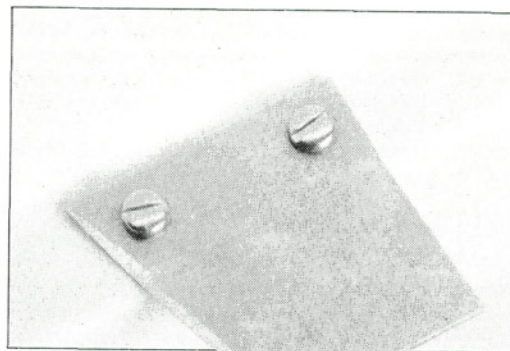
OUTBOARD ENGINE CASINGS

Assembling the lower casing halves might test your patience. After you've cut them out of the vacu-formed sheet, put one half over the tail-shaft assembly. Then, using a pencil, mark the locations where the prop shaft and the tail fin will exit the lower casing. Tape the halves together before the tail-shaft assembly is in place. Taking the prop-shaft mark as a guide, use a compass to draw a $\frac{5}{16}$ -inch-diameter circle on the base of the casing for the prop-shaft exit. Untape the enclosure and cut the prop-shaft hole. The other mark shows where to cut the slot through which the tail fin will pass. Continue to test-fit the casing halves until they fit properly, and then secure them to the tail-shaft assembly with CA. The upper casing is secured to the motor assembly with two screws.

DRESSING IT UP

I enjoyed detailing the Bud Light. The supplied crisp, colorful decals really give the boat a scale appearance, and if you follow the assembly manual's instructions, you'll find applying the decals easy. Spray the area to which the decals will be applied with water containing a few drops of liquid detergent. Then you'll be able to slide the decals into place correctly and work out the air bubbles using a soft rag.

I spray-painted the upper outboard-motor cover with black paint and the outer part of the canopy with flat-white



A metal turn fin is screwed to the inside of a sponson under the hull. The Bud tracks as straight as an arrow.

enamel. For a true-to-scale look, I painted the driver, and this really made a difference. I also painted the screw heads for a finished look.

FINAL ADJUSTMENTS

It took me about 4½ hours to build the Bud Light. Two 7.2V Ni-Cd batteries go inside the hull and are secured with two strips of Velcro®. Before I installed the batteries, however, I determined that the boat's center of gravity (CG) was $5\frac{3}{4}$ inches from the rear of the sponsons. You can move the batteries fore or aft to trim the boat (e.g., if the water is choppy, put them slightly forward of the marked CG). The calmer the water, the further aft you can put the batteries; and the further aft they are, the faster the model will be (although you won't have as much steering and tracking control because less of the sponsons will be in the water).

SPECIFICATIONS

Length: 17 feet

Width: 7 feet, 2 inches

Racing Weight: 1,050 pounds (boat, engine, rigging with fuel, oil and driver)

Hull Material: Plywood

Engine: 120ci Mercury V-6 Champ Engine with electronic fuel-injection

gear ratio of 14:15

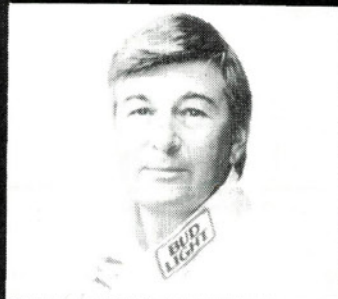
Propeller: 10x17

(diameter/pitch)

Racing Speeds: Straight-away, 140mph; laps, 110 to 115mph

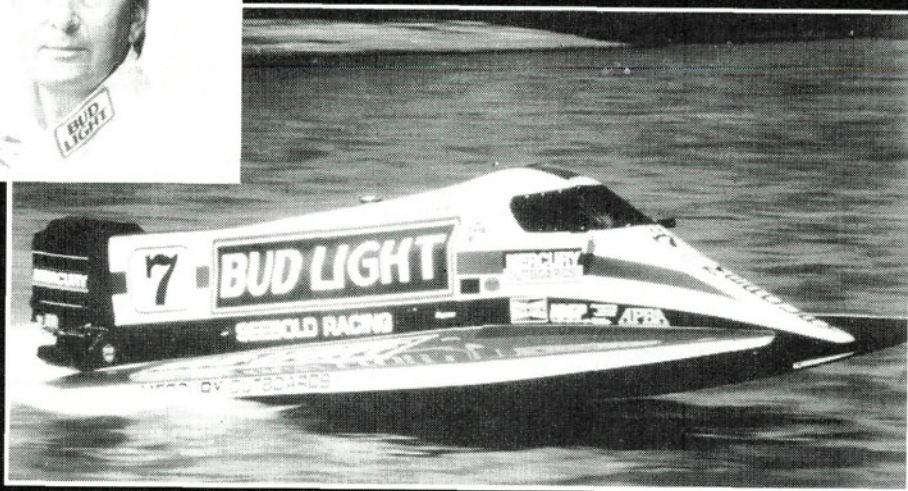
Cost for boat and engine: \$40,000

Comments: the Bud Light's powerboat safety innovations include a modified driver safety capsule that has a bubble cover made of Kevlar, carbon fiber and foam core for maximum protection.



DEVILISH DRIVER

Bud Light Tunnel

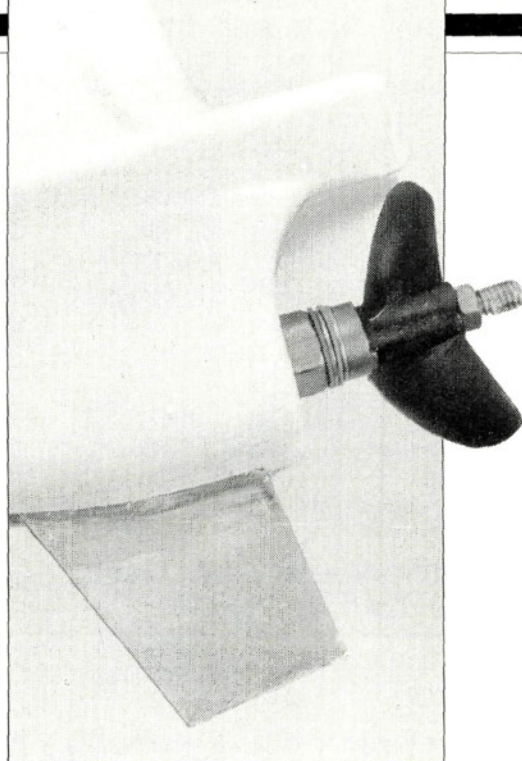
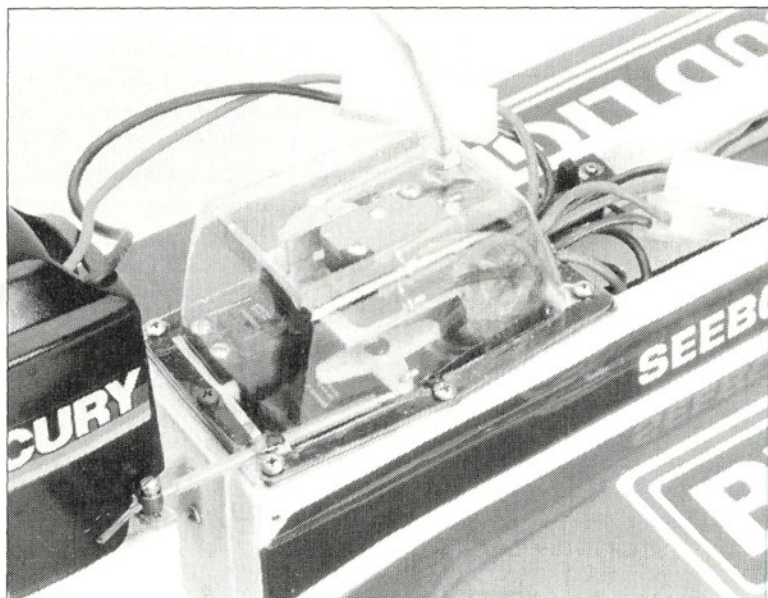


Bill Seebold is the Bud Light No. 7's driver and the senior member of the Bud Light Racing Team. In 1989, he captured the International Outboard Grand Prix National Points Championship. Seebold has been racing

for 37 years and has won more national and international championships with his Mercury-powered Seebold Hull than any other driver in the history of the sport.

AT THE POND

The MRP Bud Light Tunnel Hull performs like the full-size boat. The day of the test run was cold and windy, but I set the Bud on the water and mashed the throttle of my Airtronics* XL2P 2-channel radio. The boat took off like a shot, with its bow high in the water. After about 20 or 25 feet, the bow began to settle, and the boat seemed to skim the water. Straight runs required a slight trim alteration to the rudder



Above: The steering turn fin is welded to the curved shaft tube inside the sturdy outboard cover, which is glued over the tube.

Left: The speed controller and steering servo are protected by a clear plastic cover, which is sealed by foam gasket material.

Hull No. 7

BUD LIGHT CREW MEMBERS

Bebe Crum—crew chief; shop foreman of Seebold Boats.

Tom Stickle—former Presidential Champion powerboat driver.

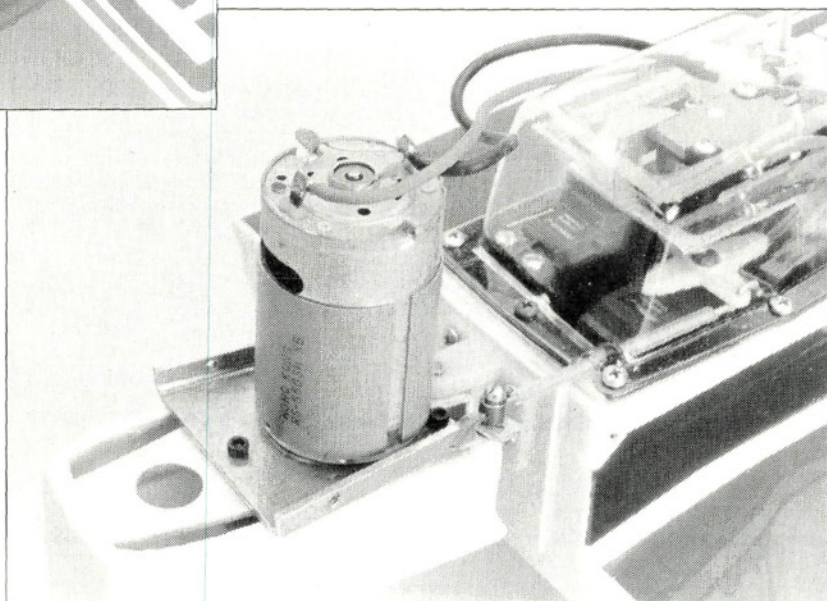
Craig Erb—experienced boat builder.

Alex Hledin—engine-design specialist.

Tim Seebold—experienced competition racer and plant manager of Eagle Boats.

Rich Marshall—works exclusively on all West Coast race boats and assists the pit crew changing gear cases.

Chris Sutter—part-time crew member; crew-team truck driver.



Here's a look under the motor casing. The motor came with its suppressor already installed, and I had no radio glitches. Notice that the steering arm is part of the stout metal frame.

because of prop torque. Once the proper adjustments had been made, however, the boat tracked as if on rails and, because of the sponson-mounted turn fin, right turns were picture-perfect. Look out you high-speed racers!

Despite problems with the assembly manual, the Bud Light Tunnel Hull is a racer's dream: a true-to-scale, fast electric boat that's guaranteed to quicken your pulse. It's not just a light—it's a Bud Light!

**Here are the addresses of the companies mentioned in this article:
MRP, 18676 142 Ave. NE, Woodinville, WA 98072.
Airtronics, Inc., 11 Autry, Irvine, CA 92718.*

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choice.



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"NOW WE'RE HAVING FUN"

TEAM CAR

(Continued from page 78)

was a little unpredictable when it crested
moguls off-power, and the TQ22 rear
tires weren't getting quite enough bite on
the hard surface.

With the next battery pack, I switched
to 20WT oil in the rear, and I mounted
Losi* X-pattern tires on the rear (after
trimming the spikes and Xs). These
changes definitely helped.

You can drive the Team Car very hard,
both into and out of corners, because it
seems to have a surplus of steering, and
the well-tried RC10 suspension geometry
really seems to smooth even the roughest
track. The key to this car's success is that
it's a combination of new and refined
parts (Stealth tranny, hard-anodized
shocks, etc.) that work well as a total
package.

I was slightly disappointed because the
car still has parts that were considered
outdated a couple of years ago. If you
want to fit a battery pack that has its cells
joined in a side-by-side configuration, the
battery box on both the graphite and the
aluminum chassis has to be repositioned.
The original servo-saver/bellcrank as-
sembly that's prone to breaking is still
included, and you have to enlarge the
holes for the hinge pins to facilitate
proper operation. Also, as they come, the
servo mounts don't fit any servo. There's
a blank nylon block that must be drilled
to accommodate the servo.

My final complaint is that the graphite
chassis is more than 1 inch narrower than
the aluminum tub chassis, so it's difficult
to install the electronics. These and other
minor problems make the Team Car the
most difficult build of the top 2WD rac-
ing machines. Nevertheless, it's very easy
to overlook the assembly problems when
you get the car on the track. Its perfor-
mance is awesome!

*Here are the addresses of the companies men-
tioned in this article:

Associated Electrics, 3585 Cadillac Ave., Costa
Mesa, CA 92626.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

RCPS, 18312 Gifford St., Fountain Valley, CA
92708.

Reedy; distributed by Associated Electric.

Team Losi, 13848 Magnolia Ave., Chino, CA
91710.

Tekin Electronics, 970 Calle Negocio, San
Clemente, CA 92672. ■



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The Hobby Dynamics Distributors boat squad with Oasis Hobby Park head honcho Israel Ben-Ezra. Left to right: Jack Johnson, Israel, Gary Kyes, Keith Beasley and Jim Watt.

Radio Control CAR ACTION Speed Works

by JIM VOTA

R E G A T



Who says "car guys" are out of their element when it comes to boats? Jumpin' Jack Johnson (left) won the Invitational Modified-Vee Class, and teammate Gary Kyes was victorious in Stock Deep-Vee. Kyes felt that decapitating the driver and throttle man would give him the edge!

SOME PEOPLE MIGHT say that "fast electric" is a contradiction in terms, but someone in the Northwest recently ran his electric at more than 70mph. Now, that's what I call *fast*! Skeptics say he has a throwaway motor in a special, non-competitive boat that's good only for a quick pass through

the timing traps, but is that really the case?

A group of boaters in the Midwest race fast electric boats of their own creation, and they're beating almost everyone! But critics have something to say about this, too. They say that these events, which are run according to the guidelines provided by the major model boat organizations, are intimidating and discourage average boaters who just want to run a stock boat built from a kit. With these objections in mind, the skeptics and electric enthusiasts decided to act.

T A

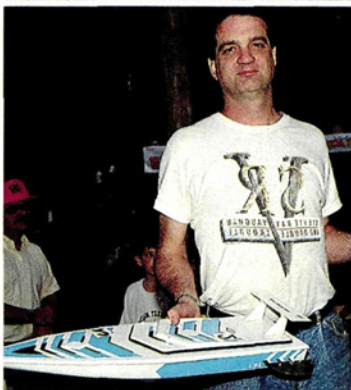
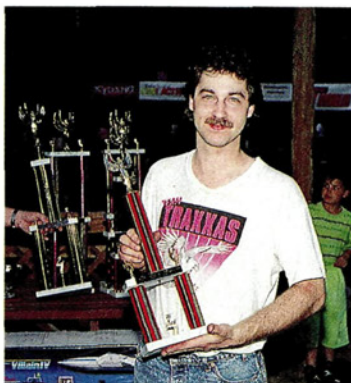


"Magic Man" goes nautical! The Regatta attracted many of R/C's top car racers. Here's Joel Johnson and his MRP Hydro—and his "rained-out regatta" cake!



PHOTOS BY JIM VOZA

WATER WARRIORS



Oasis Hobby Park in Houston, TX, has a boat pond and three car tracks, each with a drivers' stand and power. Talk about an R/C racer's dream come true!

The result was the *R/C Car Action/Speedworks Regatta*, which was held at the Oasis Hobby Park in Houston, TX, on April 4, 5 and 6.

FAST ELECTRICS ARE HOT!

The popularity of fast electric R/C boats is growing! A car racer can go out and buy a boat that's practically ready to run, or a kit that will take a minimum of effort to complete—just a few hours work. He can also use a lot of his R/C car equipment, e.g., radio, motor, batteries, charger, in an R/C boat. It was for this kind of person that the *R/C Car Action Regatta* was meant. The entry form stated: "All boats must be stock; limited to kits with plastic or polystyrene-type hulls. The only modifications allowed will be to props, speed controllers, trim tabs and rudders. No



modifications to the original hull will be allowed." Dave Willems of Trinity—a race sponsor and organizer—said, "To get people interested in the boats, you get them involved with the type of racing where they all race as equals—whether at 35mph or 45mph—and have fun."

A SUPER SITE

The Oasis Hobby Park of Houston,

WINNERS CAR ACTION / SPEEDWORKS REGATTA

Invitational Modified Vee—Jack Johnson

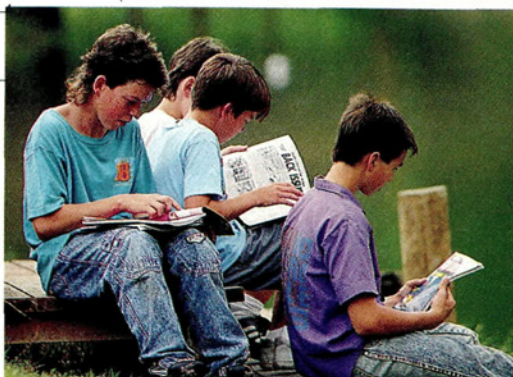
Twin Modified Hydro—Gene McCann

Single Modified Tunnel—Kevin McIntyre

Twin Modified Vee—Keith Beasley

Stock Deep-Vee—Gary Kyes

■ Above top to bottom: Team Traxxas' Tom Russell (Twin Modified Vee), Louis Johnson (Black Diamond boats) and Kurt Buckert (Modified Hydro). ■ When the action breaks, whadaya do?—read *Car Action* and *R/C Boat Modeler*, of course.



TX, is an all-encompassing electric R/C competition facility. It has not only a boat pond, but also three car tracks. A high-banked oval, a paved roadcourse and an off-road course give drivers an opportunity to choose their favorite type of racing. There's a well-stocked hobby shop; every track has drivers' towers and pit areas with A/C power; and there are food and games for all the family. Testing was scheduled for Thursday and the races for Friday and Saturday.

Many companies supported the event, not only as sponsors but also as active participants. Sponsors included *R/C Car Action*, Trinity/Speedworks, Traxxas, Victor Engineering, MRP, Litespeed and Kyosho. Bill Jeric of Kyosho and Keith Beasley of Hobby Dynamics were there, and several manufacturers imported big-name car racers to carry their colors. Gary Kyes and Jack Johnson ran for Hobby Dynamics, while Joel Johnson and Tyree Phillips ran Kyosho hulls. Right from the start, it was obvious that things were shaping up for a really big event.

An Oasis Hobby Park flyer said, "We've had such a mild winter that the racing was great [car racing]. Let's hope this first wave of spring brings coopera-

tive weather too." No such luck! We had torrential downpours and localized flooding that reduced the number of competitors, but alternative plans were soon put into action: racing would be limited to Saturday, some classes would be eliminated, and others would be combined.

TESTING...TESTING...

The bad weather turned out to be a blessing in disguise, because we had an extra day for testing. The event turned out to be a real learning experience for



■ *Top photo: Here's a white-water washout as Jack Johnson tries to swamp Joel Johnson in the Invitational Modified-Vee Class. ■ Above left: The Kyosho Jet Stream hull of Doug Harris stirs things up at the Oasis! ■ Above right: Jim Watt and his Hobby Dynamics Distributors Cesa make waves in the Twin Modified-Vee Class.*

■ *Right: Novak emissary Tyree Phillips kicks up rooster-tails in the Invitational Modified-Vee Class. ■ Middle: A unique design in the Twin Modified-Hydro Class: Kurt Buckert's Graupner Key West.*

most of us. Only three entrants had been involved in organized boat racing before, and for the manufacturers and the car racers as well as the local entrants, this event was a first.

Even with two days for test runs, the learning curve was *big!* Setups that had been adequate for recreational, open-water runs weren't right for racing. The rain put a damper on the festivities and made set-up difficult, and the pond presented another problem: it was a trifle small—so small that only three boats could run in a heat. One minor slip-up and you'd be on the shore, and this was a common occurrence on the first day, because the contestants were learning the course and had considerable trouble negotiating the turns. By the end of Thursday, most were coping well, and there was a glimmer of hope on the horizon.

A LEARNING CURVE

Manufacturers are relatively new to boat racing, too. Some of the hulls were designed for aesthetic appeal and to keep their appearance close to those of full-size boats. They ran, of course, but they weren't necessarily made for competitions. Fine-tuning a hull so that it rides properly takes time. It's not just a matter of balance, but also of tuning the running surfaces, adjusting the turn fins and trim tabs on the hull, and making propeller adjustments. This is what the teams did on Friday, and they made considerable progress toward turning their craft into competitive machines.

As well as learning hull set-up, they learned about appropriate electrical setups. Coming into the event, most

people expected to have motor problems because of the higher loads that the propellers would generate (in comparison with the loads generated by car tires, with which they were familiar). Almost everyone had a water-cooling setup on their motors, and they must have helped, because we saw very few motor problems.

Batteries were a different matter. Some of the packs were burnt up by shorts caused by water or by the high current draw of the large loads. If we didn't know it before, we all learned that water and electricity don't mix. Several electronic speed controllers (especially those that were unprotected) had problems. Dave Willem burnt up several controllers while trying to get an MRP Miss Budweiser to run. Novak controllers in their watertight, water-cooled Novak boxes had no problems, so the Novak box was suggested for the Miss Bud's Tekin speed controller. Unfortunately, there wasn't enough room. Joel Johnson put his Tekin controller in a watertight box, and his Kyosho Jet Stream had no more problems.

THE ONES TO WATCH

By the end of Friday, all but two racers had tested their boats at the pond. The Hobby Dynamics team was obviously the group to watch—at least, in the vee classes. Theirs was easily the fastest out-of-the-box boat there, but

there was one problem: with 12 cells hooked in series, the gear teeth stripped out after only about six runs. (Stronger gears are now in production.)

The Kyosho boats were steady, but not as fast, as the Cesa seemed to "run wet," i.e., lower in the water at speed. The best prop for this boat was the Octura X447, but racers' opinions were divided on whether they should use "left-hand-" and "right-hand-rotation" props. On a clockwise course, the left-hand-rotation prop is used because prop torque tends to turn a boat into turns.

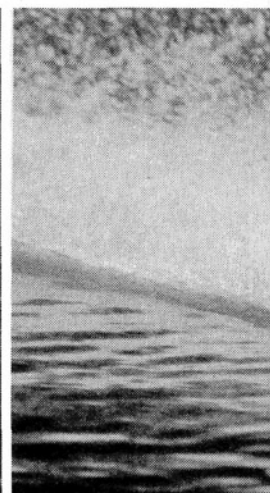
The Traxxas boys had their hands full with a boat that would actually jump right out of the water as it came out of corners. Trimming the rudder control also seemed to send it into some wild gyrations, even when it was running on the straights. Traxxas eventu-

ally ran the X447, too, but on twin counter-rotating shafts.

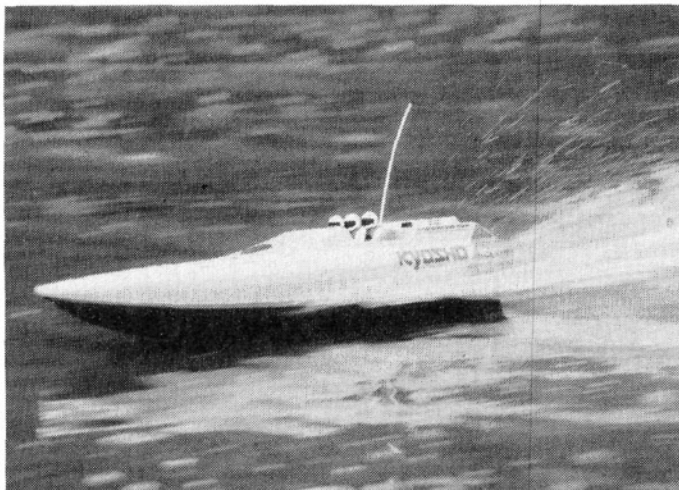
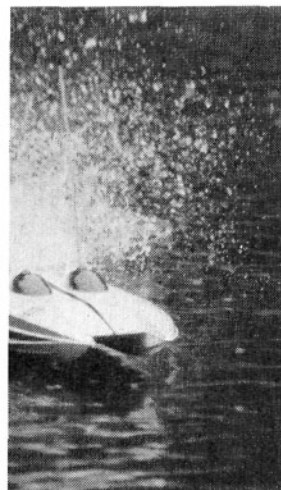
Louis Johnson of Black Diamond boats wasn't used to racing, and he spent most of the practice time on figuring out a setup for the tight course. He decided that a steady pace and consistent finishes would be enough to put him in the money.

The boat that seemed to have the greatest potential for speed was the Kyosho Hurricane, but it proved to be slightly difficult to set up for the tight course. Whether because it was too heavy or its running surfaces needed some changes, it ran a little nose-heavy and tended to hook in corners if turned too quickly. The balance was moved back in the hull and a variety of turn-fin arrangements was tried, but with only moderately successful results.

The MRP hydros had



■ *Left: Hobbico's Bill Jeric was spotted running in the Invitational Modified-Vee Class with—what else?—a Kyosho Jet Stream!*



speed-controller problems and were unable to negotiate the narrow turns, so only one hull carried the MRP banner. Their boat was the Bud Light tunnel hull, which Kevin McIntyre of Peak Performance built on Thursday evening after the first day of practice. Without modifications and with nine cells wired in series, the hull ran extremely well (a trifle slow, but its attitude was great). In the past, running this direct-drive setup with 12 cells in series and the stock motor has led to the hull's demise. With this setup, however, Kevin had little trouble during the event.

The only true hydro at the race was Todd Duhon's Electric Thunder Atlas Van Lines hull. This hull doesn't come with all the running hardware contained in other kits, so Duhon chose his own setup.

Though this wasn't exactly according to the rules, no one seemed to mind, and he was allowed to race. His setup was slightly different from the others: he used a microswitch speed controller with only two speeds, and a Hughey gear drive transmitted power to the prop. This might have been the fastest straight-line hull there—at least, to this point. Its only shortcoming was that, having been set up to run the usual larger competition course, it practically had to idle around the turns.

All except the MRP tunnel hull were twin-engine, gear-drive setups. There wasn't much interest in running 6-, 7-, or 12-cell single direct-drive setups. Thinking about it, there aren't too many boats kits with this type of drive setup. Because of this, and the slight turnout owing to the

foul weather, some classes were eliminated and others were combined. Boats ran in five classes: Twin Modified Vee, Stock Deep-Vee, Invitational Modified Vee, Twin Modified Hydro (combined cats and hydros) and Single Modified Tunnel.

Contestants running in the Stock Class were given Trinity Speedworks motors for the event. They were older, out-of-production, 25-turn, wet-magnet motors that are similar to Speedworks' new Monster Marine. A limited production run of the Monster Marine prevented Trinity from using these in the stock event.

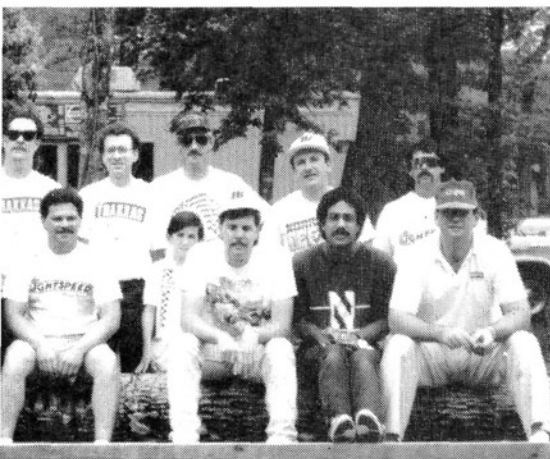
A couple of late entrants from Louisiana showed up on Saturday morning—IMPBA record holders Kurt Buckert and Gene McCann. They ran a couple of Graupner Key West hulls under the "Hobbies in Motion" banner. These kits didn't come with the hardware that the manufacturers of other kits provide. Graupner sells a separate outdrive-line kit for the boat, and it's to be used with a small Octura X442 prop. From there, they selected the Hughey gear drive and the Hughey three-speed mechanical speed controller (they were the *only* ones using it). Their setup proved to be the most trouble-free, and from the time they first tested the water, we could see that they'd be "the class" of the hydro field.

DUCKS OUT OF WATER!

Boat races are run a little differently from car races. Instead of a timed endurance run, boats ran a five-lap sprint with a flying start, which was new to most of the car racers, and it took them some time to get used to. For almost the whole of first round, racers would idle to the starting line and then punch the throttle when the race started. This was somewhat chaotic because the sudden application of power made the boats dart in all directions as they headed into the first turn. Running in traffic also seemed to be difficult for most racers. The event's announcer, Contest Director John Thawley (from ROAR) commented, "These Invitational guys are pretty impressive when they're driving *cars*; talk about ducks out of water!"

The event's most impressive performances were turned in by Jack Johnson (with his Cesa vee-hull), Kurt Buckert and Gene McCann with their Key West hulls. They all ran fast in the low 50-second range to complete the five laps. No others even came close to these times. All the vee-hull classes were won by the Hobby Dynamics Cesa (reviewed by Executive Editor Steve Pond in the Fall 1990 issue of *Radio Control Boat Modeler*).

Despite the weather, the weekend was a success, and contestants were overheard talking about when and where the next event would be. As car racer Joel Johnson was leaving, he said that he was going home to get some boats ready to race. I think the boat-ing bug has bit! ■



As the car racers found out, boat racing is a blast. Despite the rain, the Car Action/Speedworks Regatta was enjoyed by all.

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OUTLAW RAMPAGE

(Continued from page 53)

for zero degrees of camber (i.e., the tops of the tires won't lean inward or outward). This causes the truck to ride on the outside of its wheels and makes the steering unresponsive. To add some negative camber (i.e., make the tops of the tires lean inward), I shortened the links slightly. This allows more of the tire to remain in contact with the ground during cornering. I wanted to shorten the links even more, because the tie rods are too short (you can't thread them into the rod ends very far), and this increases the

chances that one of them will fall out when the car hits something.

Back on the track, the car was fast, but it was nose diving slightly over jumps. As a quick fix, I stiffened the front springs, but this didn't solve the problem. (The rear shock oil was too heavy so the rear end wasn't absorbing the bumps properly.)

Although I wasn't completely satisfied with the truck's handling (with a little work you can dial it in), I don't have any complaints about its power. In fact, sometimes it has *too much* power—yes! too much. The CZ-R(K) engine has a lot of punch and can easily break the rear

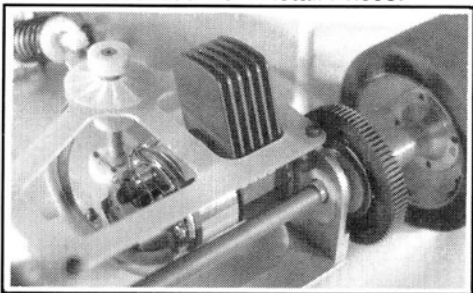
tires loose when coming out of a turn. The Outlaw Rampage demands a smooth approach to driving. Applying the throttle precisely and gradually will produce the best lap times.

As for the big question: is the Outlaw Rampage faster than electric trucks? I have to say that it is. It can achieve higher top speeds on long straights, but its acceleration isn't a match for a modified electric. (This is probably because electric motors develop very high torque from low rpm, whereas combustion engines don't develop much torque until they reach around 5000rpm.)

(Continued on page 118)

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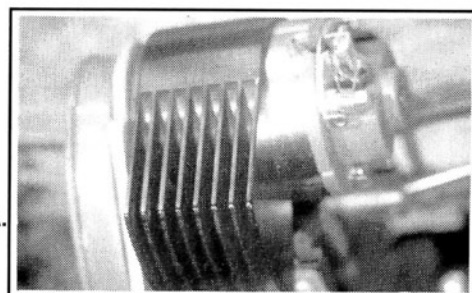


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CALIBER

BEFORE R/C CARS entered the limelight, car enthusiasts had to use converted R/C aircraft radios to guide their vehicles. These stick systems were difficult to adapt to cars because their components were large, and you couldn't adjust them precisely for surface applications. The early car radios weren't much better; they were nothing more than airplane radios with steering wheels. As the popularity of R/C cars grew, manufacturers produced radios that were designed exclusively for use with them, and the ever-increasing demands of car enthusiasts resulted in the refinement of R/C car electronics.

Airtronics' new Caliber 3P radio is one of the most sophisticated radio systems now available for us. It features space-age ergonomics and a slew of high-tech features that leave nothing to be desired by even the most discriminating R/C racers.

FEATURES AND FUNCTIONS

Using the 3P's multi-function LCD display (the system's control cen-

ter) and its numerous trim knobs, you can make dozens of fine-tuning adjustments. Here's a glossary of the 3P's capabilities.

● Computer control.

The 3P is controlled by a microcomputer that allows you to set each function quantitatively. All the adjustment information and other important data can be stored in the microcomputer's memory, and you can lock it in to prevent it from being lost.



The Caliber's DSC (direct-servo-connect) cable enables you to check the radio settings without transmitting.

● FM computer system.

The 3P transmits an FM signal that's far less vulnerable to interference than the signals transmitted by standard AM systems.

● Advanced ergonomics.

You can tailor the 3P's comfortable grip to fit your hand by using the small add-on rubber pads provided, or an optional, large, grip pad. Trackside

Artillery



For proper balance, you load eight AA batteries side by side in the bottom of the transmitter. Although individual Ni-Cds are shown, Airtronics offers an assembled Ni-Cd pack.

BEER 3P

by STEVE POND

adjustments are quick and easy because the knobs for the auxiliary channel, the steering trim, the throttle end-point adjustment, and the throttle trim are close to the steering wheel. Unlike comparable systems, you can easily alter the 3P for left-hand operation.

• Data and trim memory.

You can store the trim settings for three vehicles in the 3P's memory. Although you'd have to buy additional receivers, using this system for another vehicle is easy: just select the settings for it in the memory mode, and all of the preset trim settings will be automatically activated.

• **Adjustable-Rate Control (ARC).** This function is the same as exponential adjustment. It allows you to increase or reduce (in 1-percent increments) the rate at which the radio responds to steering and/or throttle input. This is very helpful when you're fine-tuning a car for a particular application or driving style.

• **Adjustable-Rate Control Point (ARC-P).** This function complements the ARC. It's used

movement than braking, you can limit the braking side of the trigger without affecting the

forward throttle response. This function is especially helpful with gas-powered cars that use mechanical braking mechanisms.

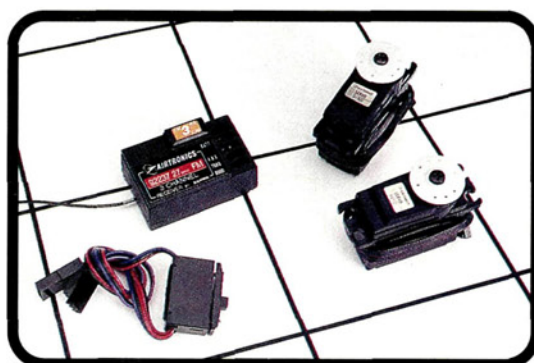
• **Starting Position Switch (S-POS).** This feature makes it easier to start and warm up

engines in gas-powered cars and boats. When you activate it, it increases the engine's idling speed. You use the "Start Position" function on the transmitter's control panel to adjust the amount of throttle that's applied (in 1-percent increments).

• **Key-lock.** The key-lock function prevents the trim settings and data from being lost accidentally.

• **Model Select (MDL-S).** This is the function that's used to store the trim settings and other data in memories that are identified as Model 1, Model 2 and Model 3.

• **Data Copy (DATA-C).** This enables you to copy

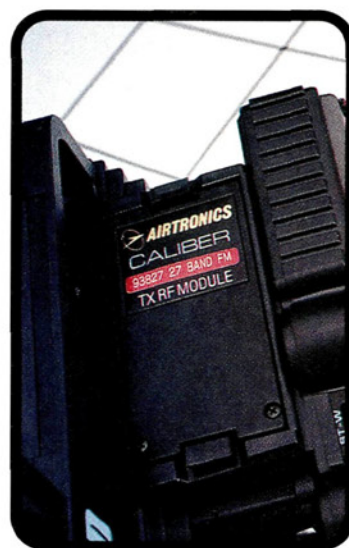


The Caliber comes with two standard servos, a narrow-band receiver and a switch harness.

to set (in 1-percent increments) exactly where in the servo's travel and/or in the speed controller's throttle response curve the ARC will take effect.

• **Steering dual rate.** With this feature, you can control how much steering your car has while it's on the track. By turning the thumb wheel on the pistol grip, you can quickly increase or decrease the steering, and you can monitor these adjustments on the LCD control panel. Each click of the thumb wheel equals a 2-percent change in the dual rate.

• **End-Point Adjustment (EPA).** End-point adjustment enables you to set the steering limits and the throttle and braking limits independently, e.g., if your car needs more forward-throttle



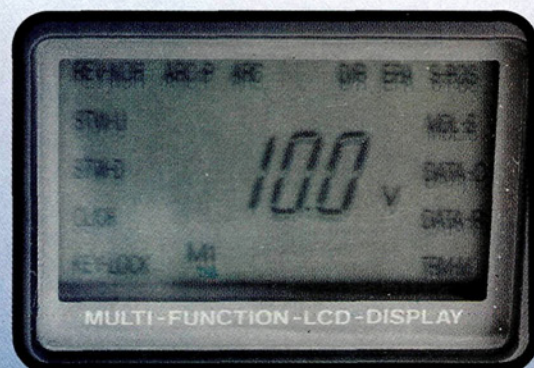
To change frequencies, remove the Caliber's receiver module. Although the Airtronics CS2P also has a removable module, it won't fit into the Caliber.

data that has been set for a vehicle in one Model into another Model.

• Data Reset (DATA-R).

This function clears all data that has been set, and it returns the settings to the factory default settings. By simply pressing a button, the radio is ready to be set for another vehicle.

• **Stopwatch with alarm.** The stopwatch function is helpful when you're practicing alone. It has two modes: a countdown timer (STW-D) and a standard timer (STW-U) that counts upward from zero.



The Caliber's large LCD display panel gives you all the information you could possibly use. The voltage level is displayed, and an alarm will sound when it drops too low.

Airtronics offers a line of high-performance servos that will blow your mind.

● **Servo-reversing (REV-NOR).** Like most radio systems, the 3P has servo-reversing. You adjust this function at the electronic control panel, and at the touch of a button, it enables you to change the direction of the steering, the throttle, or the auxiliary channel.

● **Display of power voltage (BATT).** Using this function, you can constantly monitor the voltage of the radio batteries.

BUT WAIT! —THERE'S MORE...

If your gray matter is still reeling from all this information, you're not alone. It takes a while to become familiar with all

the 3P's functions. But wait!—there are a few more!

The 3P also has a wheel-tension adjustment so that you can fine-tune the touch of the steering wheel to your liking. To make the system even more versatile, it has an interchangeable module that lets you switch frequency bands. This makes it much less of a headache to resolve frequency conflicts at the track.

Like its closest competitor, the 3P has a DSC (direct-servo-control) function that allows you

to perform trim functions (without transmitting a signal) by plugging the radio into the receiver. Unlike most systems with this feature, however, the 3P comes with the cord that's necessary to make this connection.

Also included are: a 3-channel receiver (no. 92237) with an ultra-rugged casing that will fend off all but the most severe blows; a switch harness and a 4-cell battery holder that you can use with gas-powered cars and boats or anything the doesn't have a BEC system; and

two 94102 servos. Their torque and transit time make them suitable for most R/C vehicles, but if you feel the need for something more, Airtronics offers a line of high-performance servos that will blow your mind.

OPTIONAL ACCESSORIES

If these features aren't enough to convince you that this system borders on perfection, four optional servos are also available, and they're unquestionably the best. The 94143 ultra-small servo is designed for 1/12-scale and 1/10-scale on-road competition. (Its

light plastic gears disqualify it for use in off-road competition.) Its response time is a blistering .08 second with 32 ounce/inches of torque! The 94141 servo is identical to the 94143 except that its metal gears beef it up for use in 2WD off-road cars, and it's rated at .25 second with 45 ounce/inches of torque. Both servos have the standard vertical mounting tabs, but they also have horizontal tabs so that you can mount them directly on the chassis without using servo mounts. It's difficult, however, to use a servo-saver with these servos: their smallness would bring the servo-savers too close to the chassis, so you'd either have to cut holes in the chassis to provide clearance for them or shim the servos away from the chassis.

Airtronics' large servos will have truck and 4WD racers doing cartwheels! The 94151 is the equivalent of the ERG-XS servo that's used by many of the Airtronics team drivers—most notably, Cliff Lett. With a transit time of .08 second, this behemoth servo is lightning quick for its size, and it has a whopping 75 ounce/inches of torque—enough to kick-start a Harley! If you can believe it, there's a servo that's even better. The 94152 servo is the same as the 94151 except that it has metal gears and a transit time of .12 second with 105 ounce/inches of torque. It's ideal for any

(Continued on page 170)

SPECIFICATIONS

TRANSMITTER: CALIBER 3P

Operating system: 3-channel pistol grip
Frequency module: External plug-in
Transmitting frequency: 75 and 27MHz
Modulation: FM
Power requirement: 9.6 to 12V
Current drain: 225mA

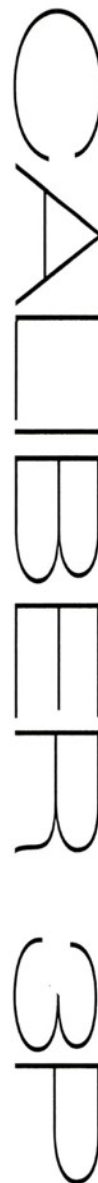
RECEIVER: 92736

Receiving frequency: 75 and 27MHz
Intermediate frequency: 455kHz
Power requirement: 4.8 to 6V
Current drain: 18mA
Dimensions 1.8x1.125x.75 inches
Weight: 1 ounce
Receiving range: 330 yards on the ground
(differs according to conditions)

SERVOS

Control system: Variable pulse width 1 to 2ms
Operating angle: 90° (45° each side)
Power requirement: 4.8 to 6V
Current drain: 10mA at 5V (idle)

Servo	Output Torque	Operating Speed	Dimensions (inches)	Weight (ounces)
94141	45 oz./in.	.25 sec./60°	1.37x.60x1.27	1.18
94143	32 oz./in.	.08 sec./60°	1.37x.60x1.27	1.08
94151	75 oz./in.	.08 sec./60°	1.55x.80x1.50	1.90
94152	105 oz./in.	.12 sec./60°	1.55x.80x1.50	2.40



STOCKCOP

by MIKE LEE

IT'S A CRYING SHAME that some R/C competitors feel they must win races at any cost. Of course, in the modified class, the name of the game has always been to go as fast as you can without losing control. In the stock class, however, the emphasis is supposed to be on driving skill. It's a racing forum in which (theoretically) all motors are equal, so you're forced to out-drive, not out-motor, the other guy. Unfortunately, some racers don't think the rules are important.

If you're a racer, you've probably seen a guy with a stock-powered car that just screams down the track. In fact, it sounds a lot like a high-revving modified, but you just can't get close enough to see its motor. Yes, there are those who actually cheat, but that's about to come to a screeching halt! Allow me to introduce you to the newest crime fighter in stock-class racing—the StockCop.

PULL OVER, BUDDY

Designed and manufactured by Competition Electronics*, the StockCop can electronically detect the difference between a stock-class armature and a modified one, and it's about 90 percent accurate. Now, 90 percent may not seem all that great, but the current methods of determining a stock motor's legality leave a lot to be desired.

There are two popular ways to check whether a motor is legal:

- Inspect the motor, and look for the trademark fixed endbell and bushings.
- Tear down the motor.

A visual inspection is only accurate about 20 percent of the time. In stock racing, tearing down the motors of the top three placers is a common occur-

rence. It's always accurate, but it ruins the motor, whether it's illegal or not. This is a hassle for the track owners, who provide the motors for the race, as well as for the drivers.

The StockCop virtually eliminates the need for inspections and teardowns,

because it tech-checks the motor efficiently and quickly. The StockCop requires only a 6-cell battery and a digital voltmeter to operate.

COP ROCK

After the 6-cell battery has been connected to the StockCop, plug in the voltmeter and bring on the first victim. Attach the two alligator clips in the rear of the unit to the motor lugs on the car motor's endbell. To avoid damaging the speed controller, make sure it has been disconnected from the motor. After it has been hooked up, switch the StockCop on, select the low DC volt range of the voltmeter, and press the large black button on the top of the unit. You only have to hold the button

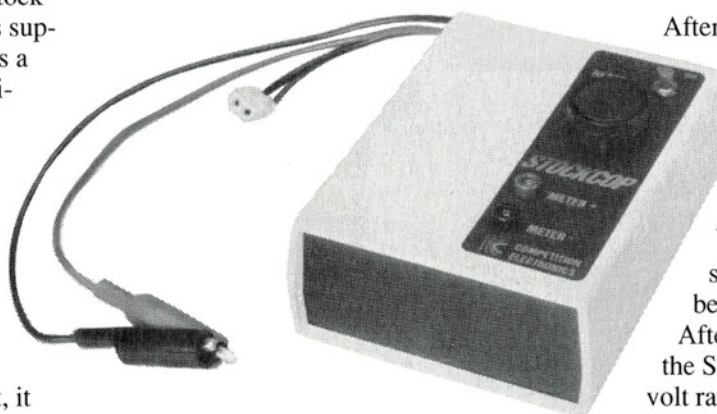
down for a second, and the voltage value will be displayed on the voltmeter. If the value is .500 to .650, you can rest assured that the motor has a stock armature. A modified motor, however, will give a very different reading. The table shows some of the results we came up with, using both stock motors and modifieds.

As you can see by the results in the chart, only one of the modified motors gave a reading in the stock-motor range. The StockCop's manufacturer claims that you'll be able to catch 90

percent of the modifieds out there, and our tests showed this to be true. So, the StockCop lives up to its claim. In other words...it works!

FREEZE, MISTER!!

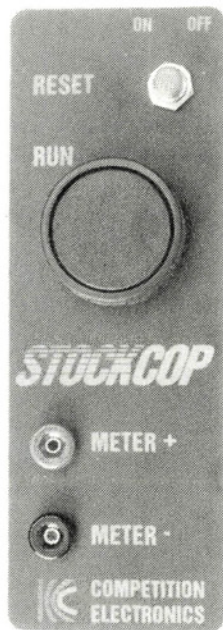
The voltmeter reads the motor windings as power is applied; this is the voltage value. Different windings and wire sizes conduct different voltages. The StockCop evaluates this and indicates



Competition Electronics' new StockCop offers a way to assess the legality of stock motors without damaging them. All that's needed is a 6-cell battery and a voltmeter.

Motor	StockCop Reading
AYK Stock Off-Road	0.528
AYK Stock Asphalt	0.559
Air Supply Stock Off-Road	0.548
Epic 1991 Stock timed	0.593
18 Triple Modified	0.636
16 Triple Modified	0.690
17 Triple Modified	0.706
12 Triple Modified	0.714

CHEATER



The StockCop's simple, user-friendly design makes tech inspecting stock motors easy. The input jacks are for the voltmeter.

whether the armature does, indeed, have 27 turns of wire in accordance with ROAR rules. In fact, the StockCop does this so well that you can hook it up to the motor backwards and still get an accurate reading!

To get the most accurate readings from the StockCop, keep these things in mind: the readings will change as its battery power decreases, so keep the battery charged; the readings will decrease if the motor is checked just after it has been running (a heated motor will show more voltage resistance); and, as I mentioned earlier, disconnect that speed controller! Overall, the StockCop is the best way we have to keep everyone honest.

Although the StockCop isn't something that most R/C enthusiasts will be keeping in their toolboxes, racetrack owners should consider it. At \$125, it's certainly more economical than paying for all those stock motors that would otherwise have been torn down. Clearly, the StockCop will save on motors and time for both the track owners and the drivers. Check it out...the newest cop to hit the R/C streets.

**Here's the address of the company featured in this article:*
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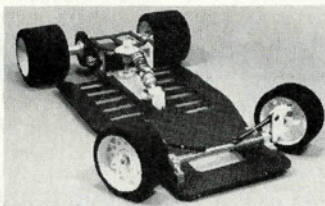
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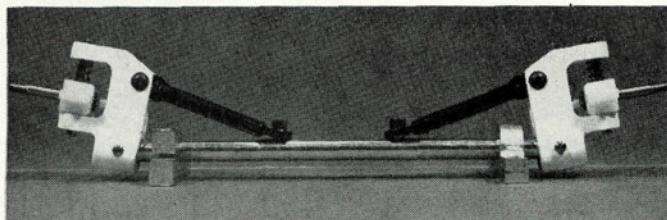
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OUTLAW RAMPAGE

(Continued from page 108)

As for the bigger question: is the Outlaw Rampage any fun? Yeah, it is! Hearing the CZ-R(K) pull out of turns and whine down the straights, you easily believe that you're watching full-size stadium truck racing. You can easily fix the truck's minor handling problems. (I've never seen a truck with this much power handle perfectly right out of the box!) Go out and get an Outlaw Rampage, because the guys at my track are afraid I'll show up their electrics, and I'm looking for some real competition!

*Here are the addresses of the companies mentioned in this article:

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

O.S.; distributed by Great Planes Model Distributors.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718

RCD (Radio Control Development), 9419 Abraham Way, Santee, CA 92071.

Sanyo Electric; Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.

Litespeed, P.O. Box 4765, Spokane, WA 99202

Pacra Inc., 620 Buckbee St., Rockford, IL 61104.

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| ☐ Dirt | ☐ Food available |
| ☐ Carpet | |

Return to Track Directory, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897.

PAINTING LEXAN

(Continued from page 63)

un-masked area with dark blue, applying the paint lightly, at first. Then, for proper coverage, I applied heavier coats. Airbrushes atomize the paint more effectively than aerosol cans. Although this means that the paint isn't as likely to run under the masking tape, it can still happen, so be careful.

When the blue paint had dried, I removed the masking tape from the area to be sprayed white. I sprayed this area, making sure that the application was heavy enough to cover properly. When the white paint had dried, I took the masking tape off the headlight covers and sprayed them silver. Finally, I painted the tinting along the top of the windshield. I lightly sprayed its top edge with very thin black and blue paint until I had achieved the depth of color. When all the paint had thoroughly dried, I removed the remaining window masking.

Using a clean cloth, I wiped the overspray off the body's exterior with the polish-remover/rubbing-alcohol mixture. I continued to use clean areas on the cloth, and I re-applied the solution every

15 seconds or so (it loses its effectiveness after that). I didn't let any of this solution touch the body's interior as it would have removed the paint.

Despite rumors that you might have heard, there's no black magic involved in painting show-stopping R/C bodies. Using the techniques described in this article, you'll be able to paint just about any scheme you want. In the next installment, I'll let you in on my detailing secrets.

**Here are the addresses of the companies mentioned in this article:*

Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21157.

Coverite, 420 Babylon Rd., Horsham, PA 10944.

Pactra Inc., 620 Buckbee St., Rockford, IL 61104.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626. ■

BLUE EAGLE

(Continued from page 72)

the tranny. Luckily, none of the gears had been damaged. The screws do have a locking washer that's supposed to prevent the screw from loosening, but a little thread-locking compound wouldn't have hurt.

I was satisfied with the Blue Eagle's

test runs. The main improvement was, without a doubt, the transmission. The bellcranks almost eliminate bump-steer, but I wasn't totally disappointed with the original setup. I'm sure that, as I drive it more, its assets will become more noticeable. Alex has one, too, and he has successfully raced his much more than I've raced mine. He managed to strip the tranny's counter-gear once, but I think he was running with the slipper set too tightly.

ADDITIONS

Now that the Blue Eagle has been around for a few months, a couple of new parts have appeared. It comes from the factory with 8 degrees of caster. There are now blocks that enable you to increase the caster to 25 degrees (which is the same as the kick-up on the front of the chassis). This will somewhat *diminish* steering response at high speeds, but it will *increase* response at low speeds. Caster can be further adjusted by adding 1.5- and 3-degree caster shims. They can also be used on the rear suspension to adjust the rear arms' anti-squat: 3 degrees of anti-squat is standard, but it can be altered from 0 to 6 degrees.

(Continued on page 130)

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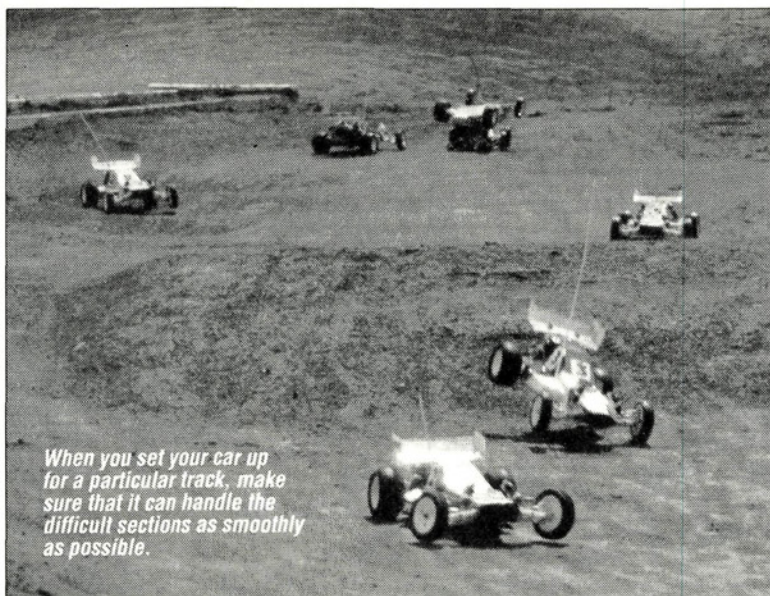
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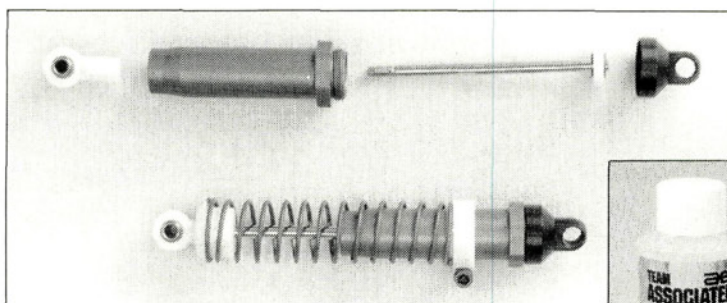
When you set your car up for a particular track, make sure that it can handle the difficult sections as smoothly as possible.

OFF-ROAD SHOCK TUNING

by FRANK MASI

WITHOUT A DOUBT, $1/10$ -scale off-road race cars require more chassis tuning than other types of R/C cars, and the number of adjustments that you can make to them is staggering. Properly tuned shocks can drastically improve your car's handling. Not knowing how shocks work and how they affect performance makes it more difficult to dial in your car.

R/C shock absorbers consist of three components: a hydraulic reser-



■ Above: they may look different, but all shocks have the same main components: a shock body, piston, shaft and coil spring. These parts work together to provide damping action for your car.

■ Right: there are many high-quality shock oils available, but 100 percent pure silicone oil (like Associated's) isn't affected by temperature changes.

voir (shock body), a piston and a coil spring, and to understand how they affect your car's handling, you must first understand what happens to the shocks when the car is in motion. The shocks control the speed at which the suspension arm is compressed when the car hits a bump, and they allow the wheels to drop into depressions on the track surface. They're also instrumental in transferring the car's

weight from front to back and from side to side. As you may know, weight transference greatly affects your car's acceleration and cornering

abilities, and it's mostly determined by the shock's coil springs.



abilities, and it's mostly determined by the shock's coil springs.

SPRING HAS SPRUNG

Essentially, shock springs provide resistance to the action of the suspension arm—the heavier (harder) the spring, the greater the resistance. A shock with a heavy spring will react very quickly to irregularities in the track surface, and the chassis will absorb more of the shock. So, using heavy springs on a very bumpy track isolates the chassis from the suspension movement and increases the chances that your car will end up on its roof. Using light (soft) springs on a very smooth, fast track will make the car lean excessively during cornering and will cause chassis roll (i.e., most of the car's weight will be transferred to its outside wheels). The fastest and most efficient corner-



SHOCK TUNING

ing occurs when all four tires have equal loads placed on them. To equalize the loads placed on their cars' tires during cornering, some oval racers place more spring tension on the outside shocks.

OIL ME, DOROTHY!

Using the right shock oil is just as important as using the proper springs. Shock oil determines the speed at which the shock operates. Thick (heavy) oil slows the shock's reaction; thin (light) oil speeds damping. As a rule, use thin shock oil for tracks with many small bumps, and for smoother tracks, use thicker oil. To determine which viscosity shock oil is best for a particular track, you have to make some compromises. There's no such thing as *the* perfect shock oil. The best that you can hope for is something between what suffices on one area of the track and excels on another. If using 40WT oil in your rear shocks enables your car to fly perfectly over a huge stadium jump, but causes the car's rear to bounce like crazy on the rest of the track, you must decide if the benefits of clearing this jump outweigh the disadvantages—get the picture? To solve the "bouncing problem," use a thinner shock oil and, perhaps, lighter springs, too.

Regarding the jumping dilemma, examine the rest of your chassis setup. Is there another way to make your car clear the jumps properly? If your car nose-dives over jumps when you use thin oil

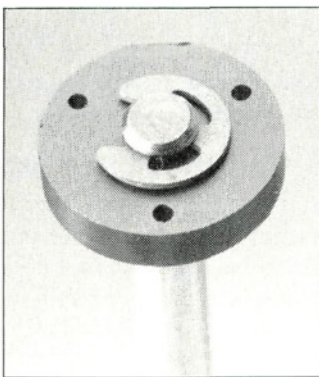
in the rear shocks, try stiffening the front springs a little by lowering the shock collars or by switching to a *slightly* heavier spring (which will lift the nose a little higher over jumps). You can also alter your throttle technique.

Try coasting up to

the jump and then stabbing the throttle just as the car crests it. This usually increases the load on the car's rear and lifts its front.

There are three ways to change the shock damping: change the viscosity of the shock oil (the most common method); change the shock's mounting position so that more or less leverage is applied to it (the more leverage, the less damping;

A shock piston is usually a nylon or plastic disk. Holes (valves) in the piston allow the shock oil to pass through, and this determines the shock's operating speed (damping).



Shock



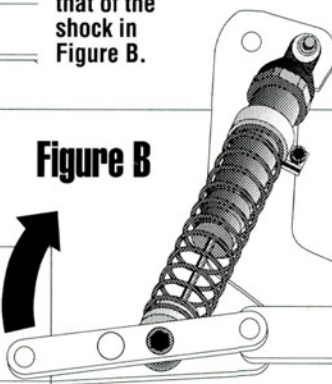
Figure A

The shock in Figure A is mounted with its bottom fairly close to the suspension arm's outside hinge pin. This gives the suspension arm less leverage on the shock. This shock's damping will be heavier than that of the shock in Figure B.

The shock in Figure B is mounted farther away from the outside hinge pin. The suspension arm has more leverage on the shock, so this shock's damping is lighter than that of the shock in Figure A.



Figure B



Leverage

the less leverage—well, you get the picture); or change the valving of the shock pistons.

PISTON PUMPING

Shock pistons are usually plastic or nylon disks that fit inside the shock body and are connected to the shock shaft. The piston, in conjunction with the shock oil, controls the speed at which the shock operates. Because the piston must be able to move through the oil inside the shock, pistons have holes (valving) in them. The larger the hole, or the more holes there are, the faster the piston will move through the oil. A piston with one $\frac{1}{16}$ -inch-diameter hole in a shock filled with 20WT oil will operate more slowly than a piston with two $\frac{1}{16}$ -inch-diameter holes in a shock with the same shock oil. Basically, you can achieve the same damping by using thick shock oil and pistons with more valving as you can by using thinner shock oil and pistons with less valving. I prefer pistons with less valving and a thin oil. The thin oil passes through such pistons more efficiently and is less likely to be trapped between the piston and the top of the shock body when the shock is compressed quickly.

HARMONIOUS HANDLING

When tuning shocks, it's important to remember that the shock oil and the coil spring must work together effectively. A heavy spring coupled with a thin shock oil will result in a shock that operates too quickly, because the thin oil offers insufficient resistance to the heavy spring. At the other extreme, combining a very light spring with a

thick oil will result in an unresponsive suspension. The spring must have enough tension to operate against the viscosity of the shock oil.

Choosing the right combination of shock settings is perhaps the most significant, and the most perplexing, adjustment you can make to improve your off-road car's handling. To properly prepare your car for a particular track, you must make it as easy to drive as possible: it has to be able to handle jumps properly, absorb bumps smoothly and corner quickly—no easy task! Most racers know how to improve their cars' ability to handle jumps and bumps smoothly, but they don't know how to improve their cars' turning ability. Shocks are often overlooked when a racer is trying to figure out why his car won't turn in corners.

Weight transference greatly affects a car's steering. The greater the weight that's transferred to the front wheels,

the more bite the front tires will have. For more turn-in, the car must be set so that the weight will

be transferred quickly from the rear to the front when it decelerates. To do this, use lighter springs on the front than on the rear. The heavier rear springs will force the car's weight forward, and the lighter front springs will be compressed quickly so that most of the car's weight will be over its front tires. Again, compromises must be made for the sake of overall handling. The light springs on the front might make the car push when exiting corners on power, and the heavier rear springs might make the rear damping too responsive, so it will be difficult to negotiate jumps. You'll have to find a balance between the amount of turn-in the car requires and the consistency of its damping on the rest of the track.

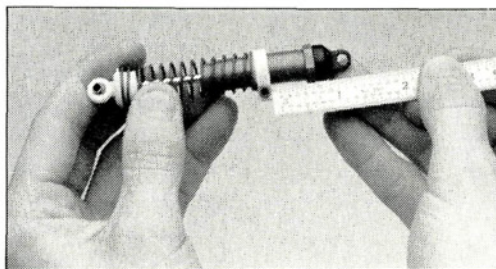
COIL-SPRING COMMANDMENTS!

To make your quest for shock supremacy easier, here's a short list of

do's and don'ts.

- The best way to determine what changes your setup requires is to ask someone whose judgment you trust to watch your car and detail the aspects of its performance while you drive it. If no one is available to watch your car, all isn't lost. Several times, I've let someone else drive my car (during practice, of course) while I stood at the side of the track, watching it intently. You'd be surprised how different your car looks from this perspective, and you'll notice things that you wouldn't from the drivers' stand.

- Never make radical changes to your car. Don't switch from 10WT shock oil to 50WT in one fell swoop; increase it gradually (i.e., go from 10WT to 20WT, and, if necessary, from 20WT to 30WT, etc.). Likewise, don't go from the lightest spring to the heaviest.



By raising or lowering the shock collar, you can change your car's ride height. Use a ruler to measure the shock collar's position. The size of the gap between the collars and the tops of the shocks should be identical.

- Dial-in the big jumps first. Make sure that your car isn't landing too abruptly or "slapping" the ground. If this happens, your rear-shock damping is too soft. This takes its toll on your lap times and on the bottom of your chassis! Set your car so that it takes the jumps with its nose neither too high nor too low. When you're satisfied with your car's performance over jumps, work on adjusting it to handle the track's irregularities. Remember, the purpose of the shocks is to keep the tires in contact with the track surface.

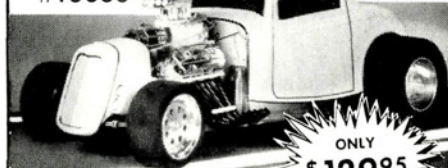
- Don't assume that you have to change the suspension settings just because you go to a different track. Throw your car down and drive it! Sometimes, very few changes need to be made to dial your car in for a new track.

- If you're having trouble, don't be afraid to talk to other racers. If they're

(Continued on page 150)

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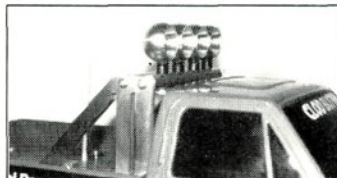
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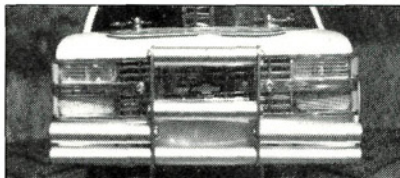
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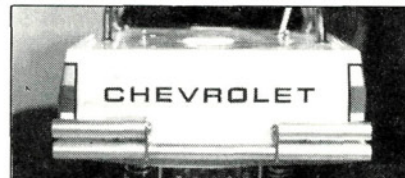
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BLUE EAGLE

(Continued from page 123)

Traxxas will release more Blue Eagle hop-up parts soon—extended shocks, lightweight dish wheels, extended rear arms, a taller rear shock tower and new Pro Series shock springs. With all these, the Blue Eagle should *really* show its talons!

*Here are the addresses of the companies mentioned in this article:

Traxxas Corp., 12150 Shiloh Rd., #120, Dallas, TX 75228.

Novak Electronics Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.

KO Propo; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

Reedy; distributed by Associated Electronics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

Schumacher Inc., 6302 Benjamin Rd., Suite 404, Tampa, FL 33634.

JG Mfg., P.O. Box 6014, Whittier, CA 90609.

Team Bruckner/Bruckner Hobbies, 2920 Bruckner Blvd., Bronx, NY 10465.

DA Graphite, 7953 Mission Bonita Dr., San Diego, CA 92120.

Litespeed, P.O. Box 4765, Spokane, WA 99202. ■

SCOPING OUT

(Continued from page 77)

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(Continued on page 140)

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SCOPING OUT

(Continued from page 130)

motors without any problems. Its high current-handling ability is the result of a very large motor and battery wires. The braking action was strong, and its current limiter's range is wide enough to allow you to adjust acceleration to almost any track. All this and its small size spells "winner."

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B&R Motorworks, 28000 Tothill Dr., Saugus, CA 91350.

Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.

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Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245. ■

WROAD WRECKER

(Continued from page 84)

BODY BY BAD BRAIN

I can't really document how this is truck became a tow truck. I just sat down at my work table with a pile of balsa on one side of me and a pile of Plastruct sheet polystyrene on the other. After a couple of

days of carving, sawing, cutting, gluing (using Jet* CA followed by a dose of Pacer* Zip Kicker) and sanding, I had the rear of a tow truck (see diagram).

The wind screen on the cab is made of a rectangular piece of polystyrene with two triangular pieces glued to its sides. I rounded the screen by sanding it whenever necessary. To make the fenders, I glued a 1 1/2-inch-wide sheet of 1/64-inch-thick polystyrene into place, and then I laminated another polystyrene sheet of the same size to it.

The boom is made of square polystyrene rods that I glued together and then bolted to the tow truck's bed. I used a Du-Bro* 3/4-inch airplane wheel to make the silver pulley at the top of the boom. The turnbuckles came from an airplane kit that I never had the courage to put together.

My only regret about this project is that I couldn't find a low-speed motor (40rpm to 60rpm) capable of handling a 5- to 8-pound load. I know there's one out there somewhere, and I'll eventually find it.

WICKED WROAD LIGHTS

Setting up the complicated lighting system was a nightmare. The Wroad

(Continued on page 147)

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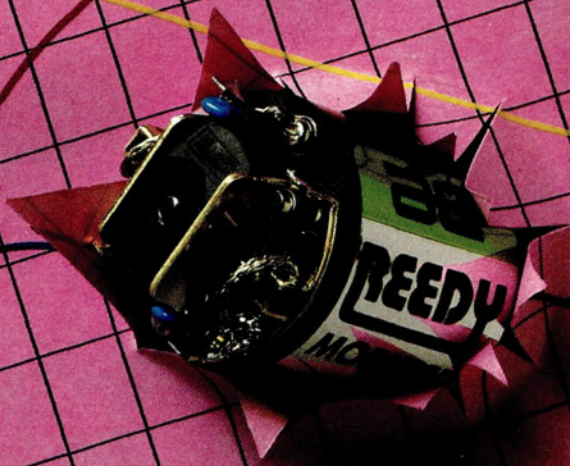
(Graph shown represents actual computer readout of Reedy Modifieds motor.)

CURRENT

TORQUE

POWER OUTPUT

OVERALL EFFICIENCY



WROAD WRECKER

(Continued from page 140)

Wrecker has 12 lights. The four hazard lights are modified Kyosho* Big Brute fog lights, and they run on 3 volts. The eight other lights use 7.2V bulbs: five of them are from Tamiya's standard lighting kit, and three of them are RAM* lights.

To add to the mélange, all except for the four headlights (two in the grill and two in the front bumper) had to flash. The hard part was getting the three RAM lights on top of the boom to flash sequentially—or at least look as though they do. I had one Tamiya flasher, one Kyosho flasher and one from RAM.

The RAM flasher has an adjustable flashing rate, so I use it for the two outside boom lights. The Kyosho flasher (from a Blizzard) only works with a single lamp, so it's perfect for the central boom light. I just adjusted the RAM unit's flashing rate so that it lights the outside bulbs when the Kyosho flasher shuts off the one in the middle (and vice versa). It was easy.

Instead of using the Tamiya flasher for the four remaining 3V hazard lights, I operate another Kyosho module with a small Radio Shack reed relay. I wired the relay in series with two pen-cell batteries and the four lights. When the relay is energized, it turns on the lights, and when it isn't, they're turned off. It works like a charm. I used Sharpie pens to "tint" the front lenses amber and the rear lenses red.

The whole lighting mess is operated by a Futaba FP-148 servo and a lever switch. When I throw the "gear" control on the 6NFK, the servo travels on its merry path, and its arm activates the lever. It's almost as good as Christmas!

WRUNNING DOWN THE WROAD

I'm thankful that the folks at Sassy had a chassis up and running before I had finished the Wrecker, so they gave me a lot of steering tips. For the first "wroad" test, however, I ignored most of their advice, and I set the truck up for full steering. The truck flipped but, luckily, it wasn't damaged. (The one piece of advice that I followed was to leave the body off the truck during the shake-out runs!)

With two pairs of rear wheels as well as the front wheels steering, the truck has the worst case of oversteer that you'd ever want to see. If it happens to be moving at full speed (which, with its three motors capable of 40,000rpm each, is

(Continued on page 150)

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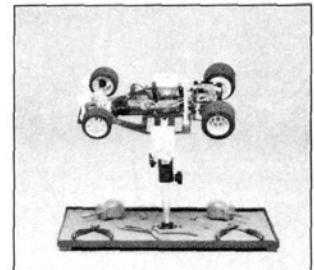
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SHOCK TUNING

(Continued from page 150)

remind you about the importance of routine maintenance, but I'm going to anyway. Change the shock oil after every hour of running (i.e., after every three or four races). As for shock oil, I recommend only 100-percent pure silicone, such as the type sold by Associated*; it won't attack the shock seals' rubber O-rings. Associated claims that its shock oil won't thicken in cold weather or thin in the heat. (This could be advantageous in areas like New England—the land of strange weather patterns!) After every six races, rebuild the shock seals so that they won't develop leaks. Most rebuilding kits cost \$2.50 to \$3.50 for each pair of shocks. For its shocks, Team Losi* offers one-piece shock rebuilding cartridges that only cost about \$1.50 for each shock. After you've rebuilt the shocks twice, replace the coil springs because they have a tendency to sag or lose their tension after prolonged use.

There's not enough space in this article for me to tell you everything I've learned about shocks in the six years that I've been racing, but I've tried to include as

(Continued on page 170)

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"Fireball" Hayes flies an F-86 by remote.



The monitor shows Ensign Nolo's view of the runway.



Paula Trisdale, operation conductor, monitors air traffic and coordinates the mission with local control towers.

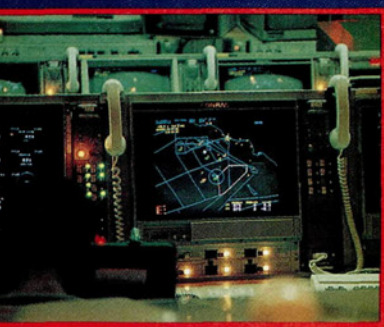
By RON WOOD

Doomed Squad

"LOOK MA, NO PILOT!"



Do you think receivers and servos only find their way into RC10s and Junior-Ts? Wrong! RPVs (Remotely Piloted Vehicles) are used by the Environmental Protection Agency for surveillance and mapping and by the Navy for laser targeting; and Kawasaki and Hirobo have developed an R/C crop-dusting helicopter that's used in Japan. This article tells how F-86s and F-4 Phantoms have been fitted with R/C systems, which, though they aren't Magnum Juniors, are still radio control.



A computer-generated map used to help Ensign Nolo fly.

ron



A Phantom and QF-86F Sabres on the flight line.

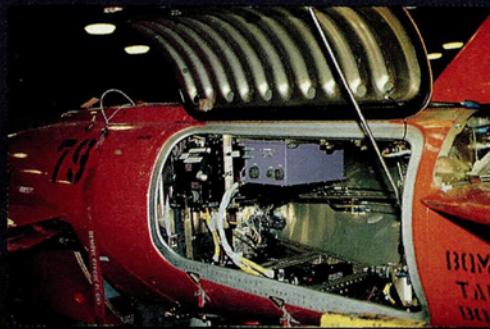


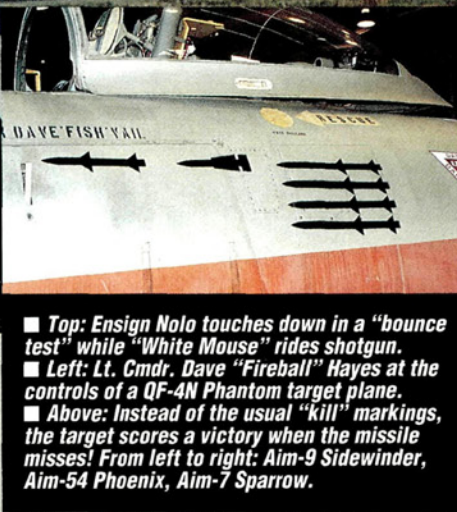
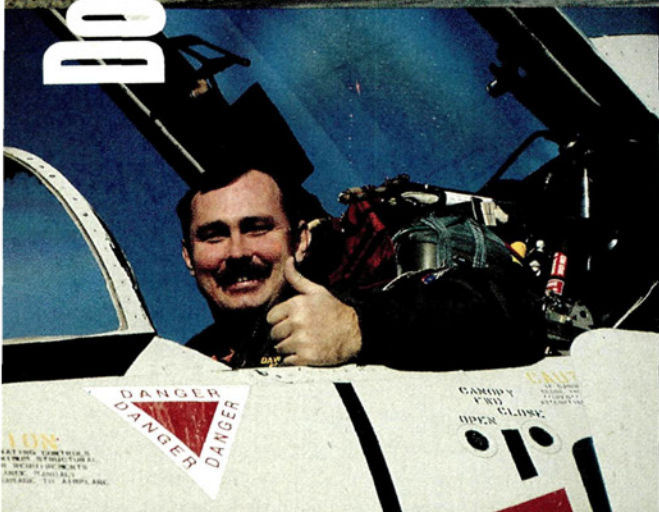
- Left: Ensign Nolo pilots an F-86 in a flyby of San Nicholas Island.
- Below left: Firebee R/C telemetry close-up.
- Below right: A Ryan BQM-34S Firebee—a sub-scale target drone.
- Bottom: A close-up of a QF-4N nose with a camera pod.

WHAT'S THE ULTIMATE R/C experience? If you were to pose this question to a number of R/C enthusiasts, you'd probably get a wide range of answers. Some would say that flying a heavy-metal warbird model to a Top Gun victory would top the list; others would say that piloting a large model such as Byron's 20-foot-wingspan B-17 would take the prize.

I think I found the answer to the question at the USN Pacific Missile Test Center at Pt. Mugu, CA. The Navy and civilian personnel at Pt. Mugu "present" a variety of remote-controlled target drones to Navy pilots for operational training or the development of new missile systems. Although the contests may seem a little one-sided, the combination of highly trained R/C pilots and sophisticated on-board computers that are capable of jamming missile tracking systems make the targets extremely difficult to hit.

Full-Scale RC tests pilots and weapons systems





■ Top: Ensign Nolo touches down in a "bounce test" while "White Mouse" rides shotgun.
 ■ Left: Lt. Cmdr. Dave "Fireball" Hayes at the controls of a QF-4N Phantom target plane.
 ■ Above: Instead of the usual "kill" markings, the target scores a victory when the missile misses! From left to right: Aim-9 Sidewinder, Aim-54 Phoenix, Aim-7 Sparrow.



■ Above: Ensign Nolo and a chase plane.
 ■ Right: Ron Gilman's Skyblazer on the wing of a QF-86F.



FULL-SCALE R/C

Known as "sub-scales," the target drones range in complexity from a simple towed platform to the 1,500-pound, 12.9-foot-wingspan Ryan Firebee. The workhorse of the Targets Directorate, the Firebee is capable of Mach .97 speeds; it has an operational ceiling in excess of 60,000 feet; and it can remain

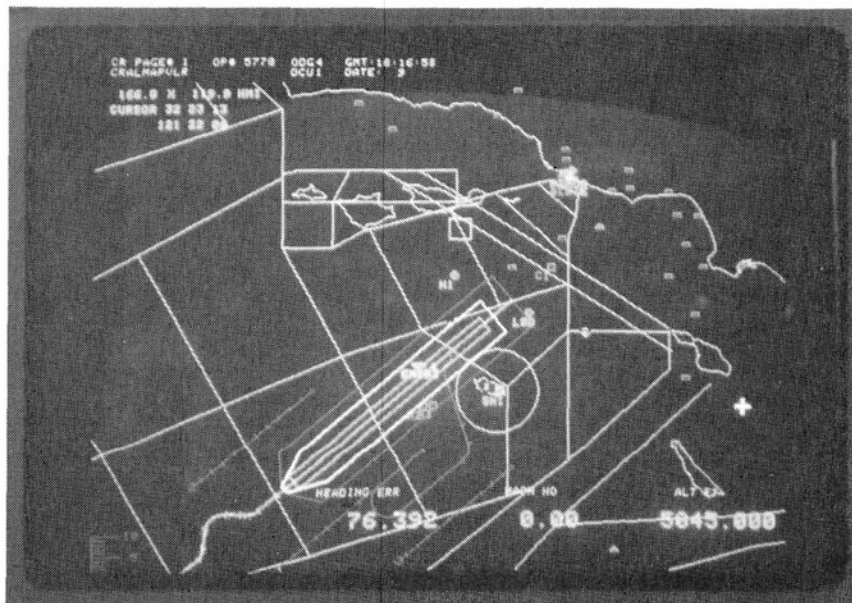
"A panic button enables the White Mouse to take control of the aircraft if needed"

aloft for almost two hours at high altitude. It's large enough to carry aluminum chaff, electronic jamming pods and flares designed to deceive heat-seeking missiles.

As sophisticated as the Firebee is, there are times when only a full-scale target can simulate actual battle conditions. What's the ultimate R/C experience? According to Cmdr. Dave "Fireball" Hayes, it's flying an F-86 Sabre or an F-4N Phantom from the ground. Cmdr. Hayes, who was given his nickname after the brakes of his F-8 Crusader caught fire on his first solo flight, is a graduate of the Navy's Top Gun school in San Diego, CA. He puts all his skills to work when flying the full-scales from a mockup of an F-86 cockpit.

"The 4,000 hours of flight time that I have don't relate a whole lot to flying from the ground," says Hayes. "There's no feel [sic] of cockpit motion, no sounds associated with the aircraft. It's a little more challenging than flying inside the airplane, especially landings."

Although the mockup is equipped with a stick, a throttle, and basic instrumentation, flying is mainly accomplished by viewing a television monitor that receives a picture transmitted from the aircraft. The 30-degree view from two cameras (one in the nose and one in the cockpit) is the pilot's only real link with the aircraft for maneuvers such as landings and takeoffs. A third monitor displays a computer-generated graphic map of the airspace and ter-



A close-up of the computer graphic map for Nolo operation. The blank areas on the grid show the clear "buffer" space around Nolo operation. The small squares are other aircraft.

must qualify and re-qualify for the operation by "bounce testing" his aircraft in the two weeks before the real thing. Bounce testing (or "touch and gos," in our lingo) must be done with a safety pilot riding shotgun inside the aircraft. The "White Mouse," as he's called, must sit in the cockpit

(with white knuckles, at times) while the remote pilot practices takeoffs and landings. A panic button enables the White Mouse to take control of the air-

craft if needed, in much the same way as the buddy-box system works at your local flying field.

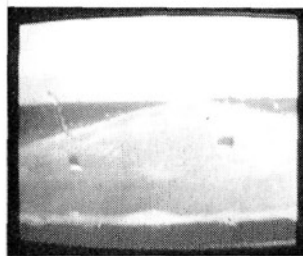
When the pilot has gained hands-on proficiency with the particular aircraft slated for the operation by flying it from the inside and from the ground, Ensign Nolo is ready to go. On the day of the mission, a pilot flies the aircraft from Pt. Mugu to San Nicholas Island, which is approxi-

mately 60 miles off the coast. The pilot gets out, the aircraft is refueled, and Ensign Nolo takes over. The aircraft rolls down the 10,000-foot runway, becomes airborne, and the operation begins.

FAILSAFE SYSTEM

When Ensign Nolo is in charge, the command center at Pt. Mugu goes into action. Hunched over banks of computer terminals, very intense men and women direct the players involved in the operation. Communication links with the pilots, telemetry, local air-traffic controllers and the operation controller are closely monitored.

The electronic systems involved are incredibly complicated, and they occasionally malfunction. What happens when a pilotless F-86 or F-4 Phantom jet suddenly loses its controlling signal from the ground? The on-board failsafe



Touch-and-go's using a TV screen?!



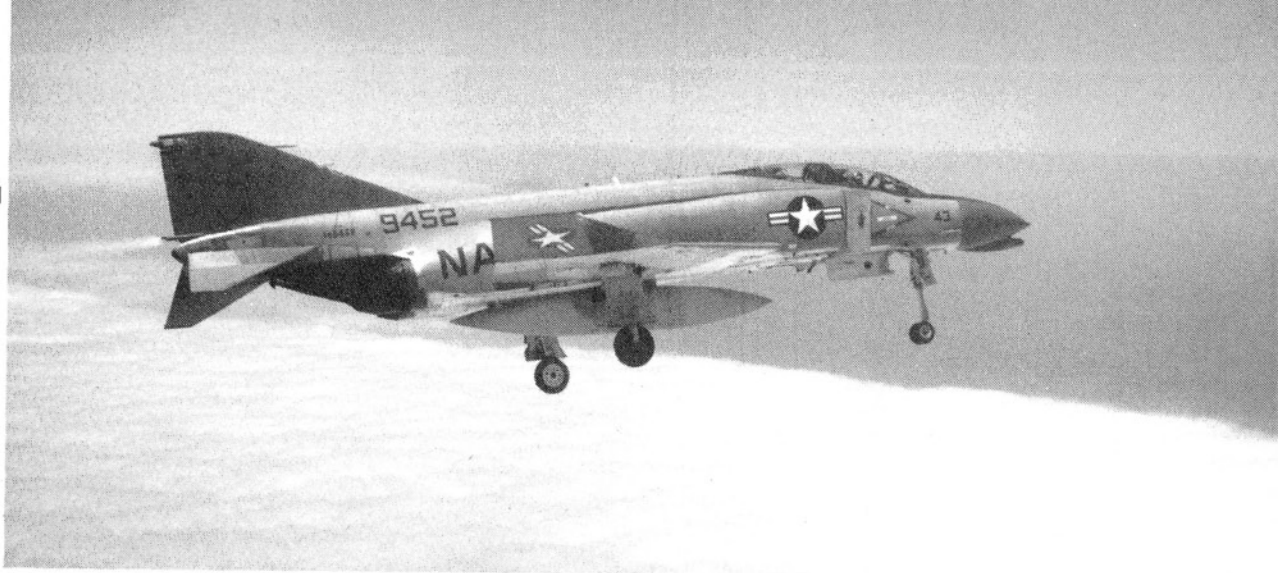
"Mo" Jones (a civilian Nolo pilot) in the seat of an F-86.

rain in the vicinity of the aircraft, and this is useful in orienting the pilot with respect to the location of land masses and other aircraft in the area.

TRAINING "ENSIGN NOLO"

When an aircraft is remotely piloted, it's said to be under the command of "Ensign Nolo,"—an acronym for "No Live Operator." Before Ensign Nolo can fly, his human counterpart

"In the operations flown from Pt. Mugu, a miss is as good as a hit."



A QF4-N Phantom with Ensign Nolo at the controls over Point Mugu. "White Mouse" rides shotgun.



UCC—a universal-command console (Ensign Nolo's cockpit).

system takes over, of course! The computer directs the servos to a pre-set heading of 220 degrees west and a 10-degree climb to 50,000 feet. Gyros stabilize the ailerons, and the aircraft flies straight and level until radio authority has been re-established. (With the advent of the latest generation of radios on the market, some of our models have

the same capability.)

Failsafe systems aren't foolproof, however. On a recent operation, two Nolo aircraft and two piloted chase aircraft were returning to San Nicholas, low on fuel. The four were in a landing pattern, with one of the Nolos about to touch down. Suddenly, the F-86 went into failsafe and immediately raised its gear and flaps, turned toward the west

and began to climb. The other Nolo aircraft also went into failsafe, and for a wild—but brief—moment, all four aircraft were flying directly at one another! Fortunately, control was re-established and no harm was done.

HOT-DOGGING AN F-4

The most recent operations have involved testing the new and improved F-14D Tomcat, which has been used extensively in the Persian Gulf conflict. Since the military budgets were cut by Congress, even the sub-scale target drones have become precious. Telemetry electronics have become so accurate, however, that weapons systems can be calibrated to aim for a predetermined point in the air, relative to the drone.

In the operations flown from Pt. Mugu, a miss is as

good as a hit. Occasionally, for a variety of reasons, an air-to-air missile actually hits the full-scale target. Even though the missile's warhead has been replaced by a telemetry payload, on impact, it does considerable damage to the aircraft. If the damage is deemed to be serious enough to jeopardize a safe landing at San Nicholas, the aircraft is destroyed "aerodynamically" by flying it into the ocean at high speed. This is the moment when the "ultimate" R/C experience reaches its peak—hot-dogging a 30,000-pound F4 Phantom! Consecutive rolls; outside loops; 10-G maneuvers, nose-down into the sea at 600 knots!

DOOMED SQUADRON DWINDLES

In the not-too-distant future, the supply of F-86 Sabres will



A Japanese QF-86F on the flight line.

run out. According to Cmdr. Bob Williams, who's in charge of full-scale presentations for the Targets Directorate, only 20 of the Korean War veteran jets remain in flying condition in the combined armed forces. In a normal Navy squadron, 170 young mechanics keep 12 airplanes in top flying form; at Pt. Mugu, 53

maintenance people (average age: 40) do the same job on 14 aircraft; and despite their heroic efforts, attrition has claimed 90 percent of the nearly 200 F-86s used as targets since the program began.

When the Sabres have all been destroyed, they will be replaced by F-4S Phantoms, of which there are many. I suggested that the Navy sell the Sabres to collectors and use the money to buy more Firebees. It seems a shame to sacrifice them all as targets, especially since an F-86 has a difficult time simulating the evasive maneuvers of even the older aircraft that are likely to be encountered in combat. Cmdr. Williams said that he would try to donate the last F-86 to the Navy Air Museum; and I contacted the folks at the Chino Air Museum (who keep their vintage aircraft in flying condition) and told them who to talk to at Pt. Mugu. Let's hope some of these historic aircraft can be saved. ■

**"...attrition
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SHOCK TUNING

(Continued from page 152)

much information as I could. The more you know about what happens when your car is on the track, the better you'll be able make corrections to enhance its performance. Good luck!

*Here are the addresses of the companies mentioned in this article:

Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

AIRTRONICS CALIBER

(Continued from page 115)

electric-car application as well as for 1/8-scale on-road or off-road running.

Drivers who are talented enough to take advantage of these servos will want them. The performance they provide, however, doesn't come without a price (from \$79.95 to \$139.95). These servos also use much more battery power than most. The two larger servos require up to an amp of power at high loads, and this is more than some speed controllers' BECs are capable of delivering.

I tested the 3P in several on-road and off-road applications, and I'd be lying if I told you I was less than thrilled with its performance. It has tremendous range (more than you need!), and its many features left nothing to be desired (with the possible exception of Ni-Cd batteries and a trickle charger).

No, the 3P isn't a PCM radio, but this FM system is relatively free from interference. Yes, I experienced some glitching, but it was caused by direct hits from another radio that was using the same channel, or by intermodulation (adjacent frequencies "ganging up" on one another). The 3P is still much less troublesome than an AM system, and it's less expensive than a PCM radio. (Receivers for the 3P are also less expensive than PCM receivers, e.g., Futaba's* R1131P PCM receiver costs \$199.95, and Airtronics' no. 92736 FM receiver costs \$109.95.)

Although there may never be an R/C radio system that's completely free of interference, the 3P is a leader in the field. It will never be a substitute for driving talent and proper chassis tuning, but it makes preparing for the drivers' stand a little easier. With all of its features, this system is reasonably priced, and accessories for it are available.

(Continued on page 186)

AIRTRONICS CALIBER

(Continued from page 170)

*Here are the addresses of the companies mentioned in this article:

Airtronics Inc., 11 Autry, Irvine, CA 92718.

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(Continued on page 188)

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(Continued from page 186)

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or Tom Hoos (313) 658-1043

TAIT'S HOBBIES & RACEWAY

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Ron DeLarme/Don Tait (517) 799-3900

MASON COUNTY R/C CAR TRACK

Mason County Fairgrounds, Ludington
Tom Allard (601) 845-8553 or (601) 843-4837

JJ's R/C SPEEDSHOP

5645 13 Mile Rd., Warren
(313) 977-0420

MINNESOTA

RAY'S R/C LAND

Brandon
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NORTHLAND R/C SPEEDWAY

2020 Silver Bell Rd., Suite 34, Eagan 55122
(612) 687-9511

MISSISSIPPI

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Ronny Barnes (601) 286-6161

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505 Spring Ridge Rd., Clinton, 39056
Thomas Bullock (601) 924-3341

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Norman Redo (601) 863-0524

MISSOURI

R/C MEGAPLEX SPEEDWAY

2527 Jefferson, Kansas City, 64108
(816) 471-7255

RC TRAX

1405 Indiana, Columbia, 65201
Bob Forsee (314) 443-0153

R/C HOBBY WORLD

113 S. 6th & Edmond, St. Joseph, 64501
(816) 233-4450

HOBBY HAVEN RACEWAY

10901-D Hickman Mills Dr., Kansas City, 64137
David Kinton (816) 763-9725

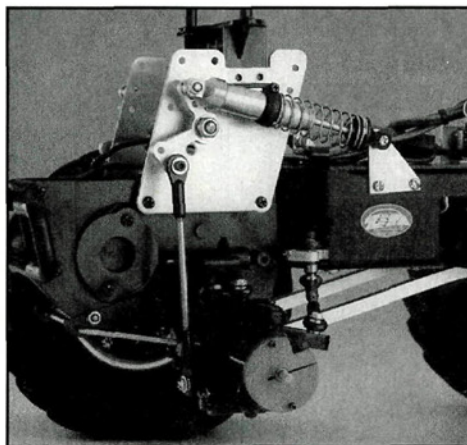
(Continued on page 200)



Innovative lineup of R/C truck accessories now includes USA-1 Cantilever Suspension System

Make your USA-1 perform like full-size stadium trucks.

- High-tech suspension system patterned after the latest full-scale monster trucks, such as Carolina Crusher™ and Bigfoot VIII™.
- Accepts most 4" shocks (not included).
- Makes the Kyosho USA-1's handling and suspension travel even better.
- Fully adjustable—fits both stock chassis and Sassy Chassis equipped trucks.

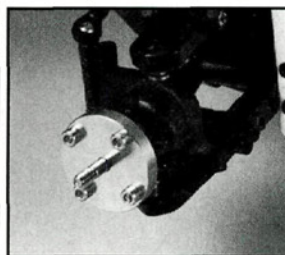
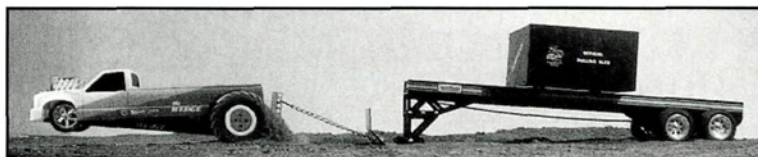


USA-1 Cantilever Suspension System

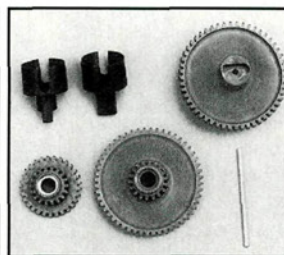
Also available only from MaxTrax:

The **Wedge** 2WD puller chassis is designed specifically for competition. The official pulling sled of the NR/CTPA, the **Eliminator** has a sturdy one-piece extruded aluminum frame that supports up to 400 lbs.

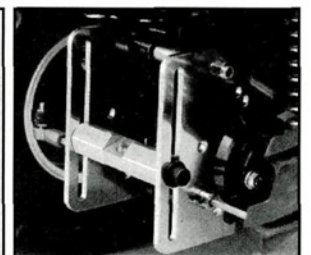
Body and chrome detail engine not included in Wedge kit.



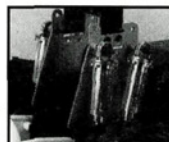
HD Aluminum Wheel Hub Set
Package of two fits front or rear wheels of USA-1 and all Kyosho monster trucks.



HD Steel Gear Set
Direct drop-in replacement eliminates differential for increased strength and traction in USA-1 and all Kyosho monster trucks.



Hitch Kits
Heavy-duty, gold-anodized aluminum hitches allow 2 1/2" of drawbar height adjustment — ideal for pulling competitions. Available for many popular monster truck models.



HD Aluminum Shock Tower
2mm aluminum front or rear shock tower set adds strength and style to 2WD Kyosho monster trucks.

DISTRIBUTED TO LEADING RETAILERS
NATIONWIDE EXCLUSIVELY THROUGH

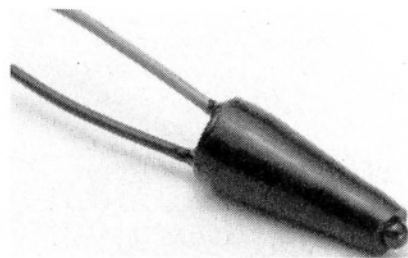


GREAT PLANES MODEL
DISTRIBUTORS COMPANY
P.O. BOX 9021
CHAMPAIGN, IL 61826-9021

Write for free MaxTrax product information packet No. 848.

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WHAT'S NEW

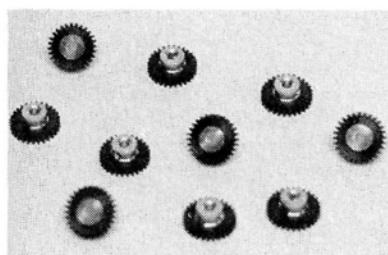


BOLD CREATIONS PowerLock Battery Discharger/Stabilizers

Bold Creations' PowerLock Battery Discharger/Stabilizer slowly discharges a battery pack to a voltage that allows the individual cells to stabilize. This prepares them for a full-power load when they're recharged, and it prevents false peaks. A light stays on during the conditioning process.

Part nos. BC010; BC012 (four-pack).

Prices: \$3.95; \$14.95.



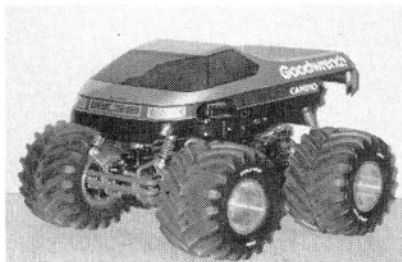
BOLD CREATIONS PowerTrain Gears

PowerTrain 48-pitch pinion gears for 1/10-scale cars are now available in the hard-to-find 28- and 30- to 36-tooth sizes. Made of tough injection-molded nylon with aluminum hubs, they're much lighter than steel gears.

Part nos. BC128 (28 teeth); BC130 (30 teeth); BC131 (31 teeth); BC132 (32 teeth); BC133 (33 teeth); BC134 (34 teeth); BC135 (35 teeth); BC136 (36 teeth).

Price: \$2.75

For more information, contact Bold Creations, 1305 Abbey Rd., Round Rock, TX 78681.



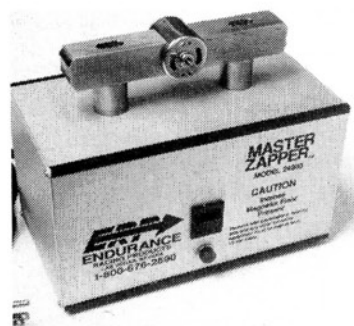
DAHM'S RACING BODIES Camino 2000

Dahm's exciting new Camino 2000 is a futuristic El Camino-style body that will fit most 1/10-scale cars. Formed of .030 GE Lexan (so it's light, yet strong) it features super-aerodynamic styling and fine detailing.

Part no. D199

Price: \$20.98.

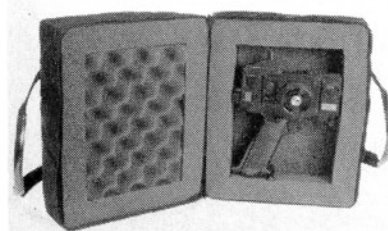
For more information, contact Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931.



ENDURANCE RACING PRODUCTS Master Zapper

This portable easy-to-use magnetizing unit produces 24,000 amp-turns of magnetizing energy, and it's capable of magnetizing ceramic and cobalt magnets to saturation in 1 second! You can connect it to a standard 120V AC outlet and adjust its pole "shoes" to fit motors of different sizes. Just align the magnets and depress the switch for 1 second. The switch will automatically shut off the unit when you release it.

For more information, contact Endurance Racing Products Inc., 626 N. Lamb, Las Vegas, NV 89110.

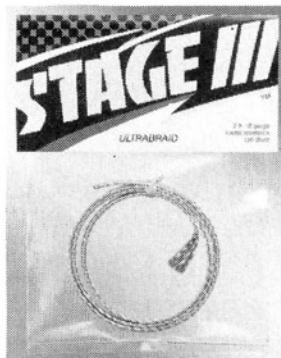


INNOVATIVE DESIGNS Transmitter Tote

Innovative Designs' Transmitter Tote protects your R/C radios in transit and at the track. This attractive, high-quality nylon case has web-strap handles, a heavy-duty coil zipper, all-around foam padding and a vinyl window for your name and channel number. The Tote can accommodate dual-stick and pistol-grip transmitters.

Price: \$39.95 (plus \$3.50 S&H)

For more information, contact Innovative Designs, P.O. Box 1733, Rogue River, OR 97537.

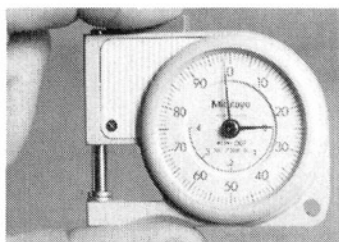


STAGE III Ultrabraid

Stage III's Ultrabraid 12-gauge, pure, copper braid provides the lowest resistance and the flexibility of stranding. Tin-plated for easy soldering, Ultrabraid is the perfect, economical, between-cell shunt connector! It flexes, so connections don't break on impact.

Price \$4.50/2 feet

For more information, contact Stage III, 1189 Chicago Rd., Troy, MI 48083.



MITUTOYO Pocket Thickness Gauges Series 7

Use these pocket-size 3-ounce gauges to measure the thickness of thin pieces quickly and conveniently. A durable, chrome-plated "spindle" provides a consistent pressure that ensures accurate measurements from .001 inch to .400 inch or 0.01mm to 9mm. It comes in two versions: the pocket gauge has a table that enables you to convert fractions into decimals; the metric gauge has a table that helps you convert inches into their metric equivalents. (The tables are on the back panels of the gauges.)

Part nos. 7308 (Pocket Thickness Gauge); 7309 (Metric Thickness Gauge).



Slim Micrometers Series 202

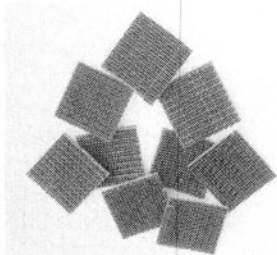
Hold this light, small micrometer comfortably in one hand while you accurately measure small parts. It comes in two styles: the "direct-feel" friction type is favored by expert machinists, and the ratchet type is used for repetitive work. It's available in a satin-chrome finish and a baked-enamel finish, and it comes in sets of nine that have ranges of 0 to 3 inches, 0 to 4 inches and 0 to 6 inches. The Slim Micrometer has a wooden carrying case that's lined with soft foam for protection.



Digimatic Micrometer

Designed for hobby use, this compact, top-of-the-line micrometer's large, liquid-crystal display (LCD) gives easy-to-read measurements at the touch of a button. Both skilled users and novices can measure precisely in inches or millimeters at the push of a button—like having two micrometers in one. It's accurate up to 50 millionths inch, and it's built to last. Under normal use, its battery will last as long as two years; automatic shutoff after two "idle" hours helps to ensure this.

For more information, contact Mitutoyo/MTI, 18 Essex Rd., Paramus, NJ 07652.



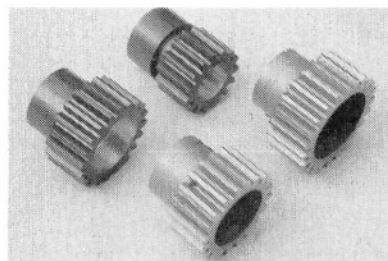
TOTAL RACING CONNECTION Super Lock Stuff

Total Racing Connection's super-strong reusable Super Lock Stuff replaces servo tape.

Part no. 204

Price: \$4.99

For more information, contact Total Racing Connection Inc., P.O. Box 1058, 2211 Charter St., Albemarle, NC 28001.



HYPERDRIVE Platinum Pinions

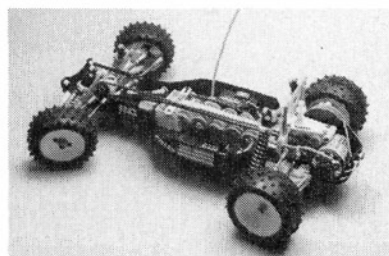
Long-known for its belt-drive systems, Hyperdrive has now geared-up with its Platinum Steel and Platinum Lite pinions. To keep rotating mass to a minimum, the Platinum Steel pinions are precisely machined out of solid steel and coated with Hyperdrive's unique Stealthcoat. Compared with other steel pinions, they're an average of 40 percent lighter; their coating reduces friction by up to 68 percent; and they last approximately 25 times longer. The superlight aluminum Platinum Lite pinions are a whopping 77 percent lighter than plain steel gears! To ensure durability and smoothness of operation, they've been coated with Hyperdrive's unique hard coating. For easy identification, the number of teeth is stamped onto both types of gear. Sneak past the competition with these quiet Platinum Pinions.

For more information, contact Hyperdrive, 3210 Howard Nickell Rd., Fayetteville, AR 72703.

(Continued on page 198)

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Radio Control Car Action**, nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Radio Control Car Action**.

WHAT'S NEW

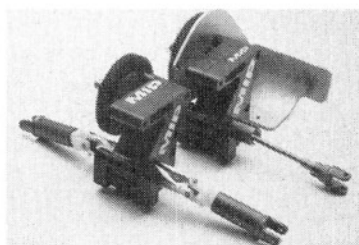


MIP '91 4-10 Legend

High-tech CAD-CAM development launches MIP into the '90s with the '91 4-10 Legend—the latest 4x4 conversion for the RC10 tub car. Having revised the 4x4 concept, for this new conversion, Eustace Moore uses the Stealth gearbox, stock steering linkages, shocks and springs, front-wheel bearings and suspensions arms. This totally new kit has the right drives and components for today's fast-paced racing. Installation is incredibly easy: just drill two holes and route the belt through the rear bulkhead.

Part no. 4-10

Price: \$160

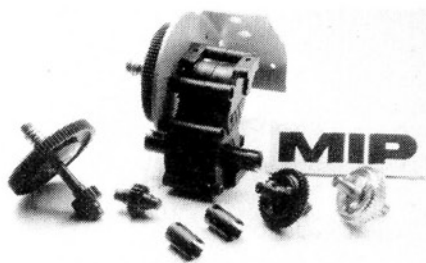


Losi Gearboxes

Developed by Eustace Moore for truck and buggy racing, these new, efficient, Losi gearboxes are replacements for stock boxes. The Pro-Box (with dogbone drives) and the Champ-Box (for stock slider drives) have a 2.3:1 final drive ratio. Both units have sealed bearings, polished thrust plates, molded and machined gears, slipper clutches and super carbide diff balls.

Part nos. LB-1000 (Pro-Box); LB-2000 (Champ-Box).

Prices: \$125 (Pro-Box); \$100 (Champ-Box).



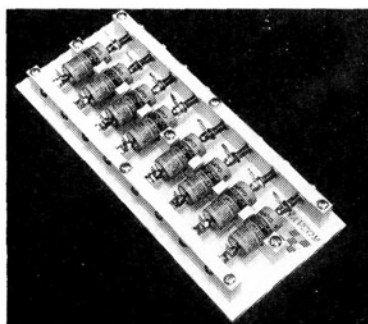
RC10 Trannies

MIP's low-maintenance Custom tranny has a gear diff with strong metal gears that won't strip or break. MIP also introduces the Classic tranny—a strong, dependable system that's built around a ball-race diff. Its fine-pitch metal gears provide smooth performance and excellent acceleration. Both kits include a slipper clutch, bearings and illustrated instructions. Spur gears aren't included.

Part nos. SP-200 (Custom); SP-1000 (Classic).

Prices: \$94.95; \$99.95.

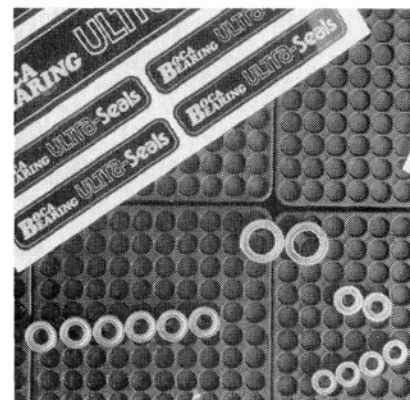
For more information, contact MIP, 838 E. Edna Place, Covina, CA 91723.



NAVCOM 8CR Cell Rack

Navcom's 8CR Cell Rack is indispensable for individual cell testing. This solid, 12x5-inch rack uses spring-loaded contacts to hold from one to eight cells, and it has push-on terminals for custom wiring.

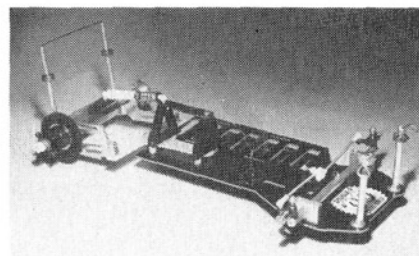
For more information, contact Navcom, Inc., 350 N. Main Street, Huron, OH 44839.



BOCA BEARING Ultra Seal Bearings

Boca Bearing Ultra-Seal wheel-bearing kits are now available in all the popular sizes (metric and U.S. measurements) for most Associated, Custom Works, Kyosho, Tamiya and Team Losi cars.

For more information, contact Boca Bearing Co., 7040 W. Palmetto Park Rd., Suite 2304, Boca Raton, FL 33433.



McALLISTER RACING Oval Only

McAllister Racing's Double-O—oval only—chassis is the result of much R&D, and it's the ultimate stock-car setup. The Double-O is an offset graphite chassis that comes with a graphite rear axle with a full-bearing diff, 2.5-inch-high stock-car front body posts, and the instructions you need to try oval racing.

Part no. MX-1003

Price: \$249.95

For more information, contact McAllister Racing, 2245 First St., Unit 105, Simi Valley, CA 93065.

TRACK DIRECTORY

(Continued from page 188)

HOBBY VILLAGE AND RACEWAY
112 N.W. Business Park Ln.
Riverside, 64150 (816) 587-6435

CUSTOM R/C RACEWAY
12019 E. 47th St., Kansas City 64133
(816) 358-0238

MID-SOUTH SCALE AUTO RACING ASSOC.
Contact: Semo Hobbies, Cape Girardeau
(314) 334-4686 or (314) 887-6958

MONTANA

MIRACLE SPEEDWAY
300 Pheasant Dr., Kalispell 59901
(406) 756-RACE

NEBRASKA

ON-ROAD
7402 Plum Dale Rd., LaVista, 68128
Doc Holiday, V.P. (402) 339-7537

HOBBYTOWN RACEWAY
Sutter Place Mall, 5221 South 48th St.,
Lincoln 68505
(402) 464-2858

HOBBYTOWN RACEWAY
Rockbrook Village, 11011 Elm Street, Omaha, 68144
(402) 391-5669

NEVADA

CIRCUS RACEWAY
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FAMILY FUN HOBBIES
201 Washington St., Claremont
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MEGA-RACING
c/o Harold Thomas
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(603) 239-4482

4-K RACING
c/o Gene Kilanski, Warwick Rd.,
Winchester, 03470
(603) 239-6207

BIRCH HILL RACING
Rt. 10, Winchester, 03470
(603) 239-8808

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Woodsville, 03785
Bill Dolack (603) 747-2165

FOX RUN RACEWAY
Fox Run Rd., Newington

FOX RUN'S RACEWAY
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From Belmont (603) 436-1112

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Brooks (603) 869-5869

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South Plainfield, 07080
Rick Gonzalez (201) 753-1518

HOBBY HEAVEN
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Kenilworth, 07033
Fred Largey (201) 272-4634

RADICAL RACEWAY
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(201) 843-6996

R/C DRAG RACING ASSOCIATION
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Warren M. Bader (609) 345-2671

ATLANTIC HOBBIES RACING WORLD
White Horse Pke., Elm, 08037 (609) 567-2947

CHIP-n-DALE
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Chris Currie (609) 261-1981

PARLOR HOBBIES
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Charlie (201) 566-3158

(Continued on page 207)

CAR ACTION QUARTZ WATCHES FOR R/C SPORTS

from Robic

You won't want to be without one of these handsome R/C sports quartz watches. These beauties look great, and they offer many advanced features:

- Precise quartz analog movement
- Uni-directional, 60-minute elapsed-time ring
- Non-corrosive, high-impact ABS-resin case
- Water-resistant to 30 meters
- Sweep second hand
- Long-life battery
- Limited Warranty

Choose from these dynamite colors: signal yellow, anthracite gray or jet black. Available for only \$29.95 each.*
Order yours today! Use our handy order form on page 195.

Credit-card orders

call TOLL-FREE:

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In CT: 203-834-2900.

* **POSTAGE AND HANDLING:** in the U.S., add \$2.95 for first item; \$1 for each additional item. **Foreign Surface mail** (including Canada and Mexico), add \$4 for first item; \$2 for each additional item. **Airmail**, add \$7 for first item; \$3.00 for each additional item. Payment must be in U.S. funds drawn on a U.S. bank, or by international money order. Connecticut residents add 8% sales tax.

Air Age Mail-Order Services, 251 Danbury Rd., Wilton, CT 06897



TRACK DIRECTORY

(Continued from page 200)

NEW MEXICO

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525 E. Madrid #6, Las Cruces, 88001
(505) 524-8530

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WEBSTER RACEWAY & HOBBY
205 North Ave., Webster, 14580
(716) 872-1598

R/C CONNECTION HOBBY & RACEWAY
Rte. 17M, Harriman, 10926
(914) 782-6244

BROCKPORT INTERNATIONAL SPEEDWAY
6000 Sweden Walker Rd., Brockport, 14420
Gil & Betty Glidden
(716) 637-6224
(716) 594-1186

HOUSE BROS. R/C SPEEDWAY
217 Pine St., Theresa, 13691
(315) 628-5065

TRANSIT SPEEDWAY & HOBBIES
5319 Transit Rd., Depew, 14043
(716) 684-7368

SENECA R/C
2339 Yerkes Rd., Romulus, 14541
(315) 568-4262

GLD RACECARS
370 B Commack Rd., Deer Park, 11729
(516) 243-4152

HOUSE BROS. R/C SPEEDWAY
217 Pine St., Box 359, Theresa, 13691
(315) 628-5065

PERFORMANCE PLUS RC SPEEDWAY
114 1/2 Jones & Gifford Ave., Jamestown, 14701
Larry Newton (718) 488-1772

CAPITOL DISTRICT R/C OUTLAWS
223 Fourth St., Scotia, 12302
Same Roberts (518) 374-3801

JAMESTOWN R/C SPEEDWAY
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Jamestown, 14701
Craft World (716) 484-1780

(Continued on page 210)

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Sanyo 1700 SCE Cells

Up to 639 - \$3.00 each
640 - 649 - \$3.75 each
660 - 669 - \$4.50 each
670 - 679 - \$5.50 each
680 - 689 - \$7.00 each

Sanyo 1200 SCR Cells

500+ 6 Cell Pk \$25.00
515+ 6 Cell Pk \$35.00

JACO Tires and Wheels

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280+ 6 Cell Pk \$30.00
290+ 6 Cell Pk \$42.00

New B&T 300+ Blister Pks

\$55.00 for 6 Cell Pk
\$60.00 for 7 Cell Pk

New Killer Bushing Mods.

By Phoenix 13D 14D 15D
Also 1500 Max Tork Stock

B & T Racing Team

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RACE OWNERS!!! PUT YOUR TRACK ON THE MAP! Turn back to page 118 now!

ARE YOU GOING FISHING OR RACING?

The **T.D. PIT BOX II** is not another PLAINold carrying case or tackle box. It's a fold out "work-area" designed especially for R/C cars. It includes: a car stand, removable work tray, universal transmitter holder, and a place for everything! Your car stays mounted on the stand (with the body on) and folds up sideways with the work tray during transport.

The **T.D. PIT BOX II** holds 1/10 and 1/12 on and off road cars and comes assembled in unfinished birch ply. Measuring 25"W x 14 1/2"D x 14 1/2"H when closed, the **T.D. PIT BOX II** is designed to keep your gear organized and put an end to fishing for tools at the track.

The **T.D. PIT BOX II** with Car Stand Included is only \$89.95 + \$10 Shipping. Car Stand Available Separately for \$19.95 + \$3.00 Shipping. (Check, M.O. or COD Only) Ohio res. add 6% sales tax. **Order Yours Today!**



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1-800-253-7229 ORDERS ONLY **T.D. ENTERPRISES** **PIT-BOX II**

FOR A FREE BROCHURE, SEND A SELF ADDRESSED STAMPED ENVELOPE TO: T.D. ENTERPRISES, P.O. BOX 3301, LEXINGTON OHIO, 44904

ISLAND HOBBIES & RACEWAY

Introducing the "PULL"VERIZER

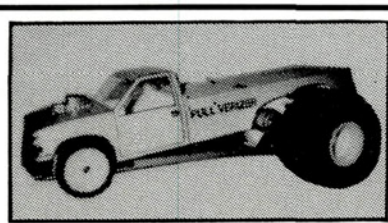
1/10th Scale Pulling Truck

Standard Features:

★ Commercial-Grade Bearings Front & Rear ★ Hitch ★ Aluminum Chassis ★ Adjustable Wheelbase
★ Sealed Gearbox w/550 Motor
★ Std. 90:1 Gear Ratio ★ 3/8-in. Rear Axle ★ Aluminum Rear Mounting Hubs ★ Tires and Wheels

NR/CTPA-Legal
in 2WD Sportsman
& 2WD Open I

PRICE:
\$249⁰⁰



"I don't see any reason why the 'Pull'verizer would not be competitive..."

— President, NR/CTPA

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DOZEN DIFFERENT
STYLES!



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• TORNADO



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(Continued from page 207)

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Dave (516) 234-7428

NY 500 OFF-ROAD RACE TRACK
110-27 Jamaica Ave., 2nd floor
Richmond Hill, 11418
John Lee (718) 847-2327

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